Abstracts

THE NORTHEAST NATURAL HISTORY CONFERENCE IX

APRIL 20 – APRIL 21, 2006

A FORUM FOR CURRENT RESEARCH

The New York State Biodiversity Research Institute

NYS M NEW YORK State Museum

NYFA

The *Northeastern* *Naturalist*

The New York State Museum is a program of The University of the State of New York/The State Education Department

APRIL 20 – APRIL 21, 2006

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The Northeast Natural History Conference IX is a joint project of the New York State Museum, the New York State Biodiversity Research Institute, and the New York State Museum Institute. It is sponsored in part by the New York Flora Association and the *Northeastern Naturalist*. The conference is held biennially at the New York State Museum and the Empire State Plaza Convention Center in Albany, NY. Previous conference abstracts and conference updates are available from the Northeast Natural History Conference website: **http://www.nysm.nysed.gov/nhc.**

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Conference Highlights

Focus on Nature IX — Opening Reception

A Natural History Art Exhibit at the New York State Museum
Thursday, April 20, 2006
5:30 p.m. – 6:30 p.m.
Exhibition Hall, New York State Museum
(Reception open to all conference participants.)

The Exhibition: *Focus on Nature* (FON) is a biennial exhibit of scientific, natural and cultural history illustration that began in 1990 in conjunction with the Northeast Natural History Conference. While the opening still coincides with the Natural History Conference, the exhibit has taken on a life of its own and each year the geographical representation, breadth of subject matter, and quality has increased to a level of high standard and international participation. Artworks considered for inclusion must accurately represent the subjects, or research reults and processes. *Focus on Nature IX* will coincide with an exhibition celebrating the 10th year of COM.EN.ART, a natural history artist's resedency which takes place at the Edmund Niles Huyck Preserve, Rensselaerville, NY.

The purchase prize money will be $10,000 and is awarded on the basis of high quality, scientific accuracy, and aesthetic achievement. The artwork will be accessioned into the permanent collection of the New York State Museum. This collection includes approximately 18,000 illustrations primarily created for museum publications, by such artists as Louis Agassiz Fuertes, George Barkentin, Ernest Thompson Seton, Mary Banning, and numerous excellent contemporary artists. *Focus on Nature IX* will be exhibited from April 20, 2006 to September 10, 2006.

Keynote Address

Dr. Stephen C. Trombulak
Professor of Biology and Environmental Studies, Middlebury College
Thursday, April 20, 2006
8:00 p.m. – 9:30 p.m.
Clark Auditorium, New York State Museum

The Human Footprint in the Northern Appalachian/Acadian Ecoregion

Trombulak*, Stephen C. (Department of Biology and Program in Environmental Studies, Middlebury College, Middlebury, VT 05753)*

The Northern Appalachian/Acadian ecoregion covers portions of four U.S. states (New York, Vermont, New Hampshire, and Maine) and four Canadian provinces (Quebec, New Brunswick, Nova Scotia, and PEI). It has one of the longest histories of post-Columbian human development in North America, which has had a profound effect not only on the natural history of the region but also on the prospects for conservation in the 21st century. To understand the magnitude and distribution of human transformation in the region, my colleagues at the Wildlife Conservation Society and the Nature Conservancy and I developed a spatially explicit map of its human footprint. We used region-specific datasets at a high resolution (90 × 90 m) to reveal not only the remaining "wild" landscapes and potential ecological linkages within the area, but also to identify potential low-cost opportunities and priorities for conservation action. The data sets used to assess the human footprint include measures of human settlement (both population and dwelling density), land use/land cover, transportation networks, electrical power lines, and dams. Human footprint scores are then calculated by summing the scores across all the data sets and normalizing the total between 0 and 100. I will discuss the patterns observed in the human footprint map, including identification of the areas under the greatest stress and analysis of how the human footprint corresponds to the region's existing network of protected areas.

Overview of Conference Sessions

THURSDAY – April 20, 2006			
Meeting Room 1	Meeting Room 2	Meeting Room 3	Meeting Room 4
Bird Conservation & Monitoring 8:20 AM – 10:00 AM	Invasive Species & Botanical Studies 8:20 AM – 10:00 AM	Devonian to Holocene: New Discoveries from Rocks & Sediments in the Northeast 8:40 AM – 10:00 AM	Ecological Status & Recovery of Acidified Adirondack Surface Waters 8:20 AM – 10:00 AM
BREAK 10:00 AM – 10:20 AM			
Biodiversity Conservation in New York State Parks 10:20 AM – 12:00 PM	Invasive Species Actions in the Adirondacks 10:20 AM – 12:00 PM	Devonian to Holocene: New Discoveries from Rocks & Sediments in the Northeast (cont.) 10:20 AM – 12:00 PM	Ecological Status & Recovery of Acidified Adirondack Surface Waters (cont.) 10:20 AM – 12:00 PM
LUNCH 12:00 PM – 1:20 PM			
Biodiversity Conservation in New York State Parks (cont.) 1:20 PM – 3:00 PM	Invasive Species Actions in the Adirondacks (cont.) 1:20 PM – 2:40 PM	Amphibians 1:20 PM – 3:00 PM	Aquatic Ecology 1:00 PM – 3:00 PM
POSTER SESSION (Meeting Room 6) 3:00 PM – 5:00 PM			

FRIDAY – April 21, 2006				
Meeting Room 1	Meeting Room 2	Meeting Room 3	Meeting Room 4	Meeting Room 5
Direct & Indirect Effects of Roads on Amphibians & Reptiles 8:20 AM – 10:00 AM	Avian Distribution & Ecology 8:20 AM – 10:00 AM	Floristic Studies 8:20 AM – 10:00 AM	Urban & Wilderness Mammals 8:00 AM – 10:00 AM	Biodiversity Conservation in Practice 8:00 AM – 9:40 AM
BREAK 10:00 AM – 10:20 AM				
Direct & Indirect Effects of Roads on Amphibians & Reptiles (cont.) 10:20 AM – 12:00 PM	Avian Distribution & Ecology (cont.) 10:20 AM – 12:00 PM	Invertebrates 10:20 AM – 12:00 PM	Biodiversity of the Hudson Highlands 10:20 AM – 12:00 PM	Biodiversity Inventories, Mapping & Modeling 10:20 AM – 12:00 PM
LUNCH 12:00 PM – 1:20 PM				
Turtles - Session I 1:20 PM – 3:00 PM	Colonial Waterbirds in Northeastern North America 1:20 PM – 3:00 PM	Dragonflies & Damselflies: Species Studies & Surveys 1:20 PM – 3:00 PM	Biodiversity of the Hudson Highlands (cont.) 1:20 PM – 2:20 PM	Forest Ecology 1:40 PM – 3:00 PM
BREAK 3:00 – 3:20 PM				
Turtles - Session II 3:20 PM – 5:00 PM	Colonial Waterbirds in Northeastern North America (cont.) 3:20 PM – 4:40 PM	Dragonflies & Damselflies: Conservation 3:20 PM – 4:40 PM	Timber Rattlesnakes 3:20 PM – 4:20 PM	Post-Disturbance Ecology 3:20 PM – 5:00 PM

Schedule of Oral Presentations

(*Indicates Presenter)

Bird Conservation and Monitoring

Thursday, April 20, 2006, Meeting Room 1
Contributed Oral Session

Moderator: *Jillian M. Liner (Audubon New York, Ithaca, NY)*

8:20 AM ***Corwin**, Kimberley and Kevin J. **McGowan***
New York's Second Breeding Bird Atlas: Twenty Years of Change

8:40 AM ***Zuckerberg**, Benjamin, William F. **Porter**, and Kimberley **Corwin***
Can Atlas Data be Used to Monitor Avian Population Change?

9:00 AM ***Norment**, Christopher J. and Sarah A. **Lazazzero***
Twelve Years of Grassland Bird Research in the Northeast: Perspectives and Issues

9:20 AM ***Liner**, Jillian M., Michael **Burger**, and Kenneth **Rosenberg***
Priority Bird Species: Looking Beyond NY's Endangered, Threatened and Special Concern List

9:40 AM ***Deutschlander**, Mark E.*
Monitoring the Migration of Songbirds at the Braddock Bay Bird Observatory

10:00 AM **Break**

Biodiversity Conservation in New York State Parks

Thursday, April 20, 2006, Meeting Room 1
Organized Symposium

Organizers: *Thomas B. Lyons and Karen B. Terbush (New York State Office of Parks, Recreation and Historic Preservation, Environmental Management Bureau, Albany, NY)*
Moderator: *Thomas B. Lyons*

10:20 AM ***Robinson**, George R., Amanda J. **Stein** and Thomas B. **Lyons***
Assessing the Role of New York State Parks in Preserving Biodiversity

10:40 AM ***Lawton**, Gary J. and Pamela **Otis***
Status of Piping Plover and Least Tern Productivity at Long Island State Parks

11:00 AM ***Stein**, Amanda J. and Thomas B. **Lyons***
Feral Cat Colonies and State Parks: Challenges, Stakeholders and Control Options

11:20 AM ***LeBlanc**, Thomas P.*
Northern Saw-whet Owl Migration in Allegany State Park, New York

11:40 AM ***O'Brien**, Robert T., Pamela **Otis**, and Christina **Croll***
Invasive Plant Control Planning at Minnewaska State Park Preserve: A Working Model

12:00 PM **Lunch**

1:20 PM ***Belding**, Edwina and Kenneth **Smith***
Protection of the Blanding's Turtle (*Emydoidea blandingii*) at James Baird State Park

1:40 PM ***Terbush**, Karen B. and Thomas B. **Lyons***
Glass, Birds, Science and the Observation Tower at Niagara Falls State Park

2:00 PM ***Whiteleather**, K. Kristian and Alvin R. **Breisch***
Population Status of NY's Endemic Chittenango Ovate Amber Snail

2:20 PM ***O'Brien**, Kathleen M.*
Dogs vs. Butterflies: Public Access in Endangered Species Habitat

2:40 PM ***Corbett**, Allison*
Dogs, People and the Karner Blue Butterfly at Saratoga Spa State Park

3:00 PM **Poster Session**

Invasive Species and Botanical Studies

Thursday, April 20, 2006, Meeting Room 2
Contributed Oral Session

***Moderator:** Steven Jay Sanford (Bureau of Habitat, New York State Department of Environmental Conservation, Albany, NY)*

8:20 AM ***Sanford**, Steven Jay*
Findings of the New York State Invasive Species Task Force

8:40 AM ***Zimmerman**, Christopher L., Stephanie B. **Gifford**, and Emma **Bachmann***
Inventory and Assessment of Invasive Plant Species in the Catskill Mountains

9:00 AM ***Kiviat**, Erik, Jennifer **Grieser**, and Gretchen **Stevens***
Japanese Knotweed Stand Characteristics and Associated Biota

9:20 AM ***Clark**, Theresa A.*
Relationship of Bryophyte Communities to Decay Class of *Thuja occidentalis* Logs

9:40 AM ***Tessier**, Jack T.*
Vernal Carbon Translocation from Senescing to New Fronds in *Dryopteris intermedia*

10:00 AM **Break**

Invasive Species Actions in the Adirondacks

Thursday, April 20, 2006, Meeting Room 2
Organized Symposium

***Organizer and Moderator:** Daniel M. Spada (New York State Adirondack Park Agency, Ray Brook, NY)*

10:20 AM ***Malchoff**, Mark L., J. Ellen **Marsden**, and Michael **Hauser***
Feasibility of a Champlain Canal Aquatic Invasive Species Barrier

10:40 AM ***Malchoff**, Mark L., Daniel L. **Kelting**, and Hilary A. **Oles***
Strategic Planning for Regional Progress: The Adirondack Park Aquatic Nuisance Species Management Plan

11:00 AM ***Spada**, Daniel M., Steven **Flint**, and Sunita S. **Halasz***
Invasive Plants on the Adirondack Forest Preserve: The State of Our Knowledge

11:20 AM ***Holmlund**, Eric R.*
Public Education and Invasive Species Interdiction at Adirondack Boat Launches

11:40 AM ***Oles**, Hilary A.*
An Integrated Approach to Regional Invasive Plant Management in the Adirondack Park

12:00 PM **Lunch**

1:20 PM ***Kelting**, Dan and Curt **Stiles***
Managing Eurasian Watermilfoil in Upper Saranac Lake

1:40 PM ***Nowak**, Christopher A. and E. **Lema***
Japanese Knotweed Control along Road Corridors in Blue Mountain Lake, New York

2:00 PM ***Titus**, John E. and Rebecca A. **Urban***
The Submersed Macrophyte *Utricularia inflata*: A Nuisance Invader or Critically Imperiled?

2:20 PM ***Urban**, Rebecca A., John E. **Titus**, and Wei-xing **Zhu***
Shading by an Invasive Macrophyte Affects Native Isoetid Growth and Sediment Chemistry

2:40 PM **Discussion**

3:00 PM **Poster Session**

Devonian to Holocene: New Discoveries from Rocks and Sediments in the Northeast

Thursday, April 20, 2006, Meeting Room 3
Organized Symposium

Organizer and Moderator: *Norton G. Miller (New York State Museum, Albany, NY)*

9:00 AM ***Stein**, William E., Frank **Mannolini**, Linda Van Aller **Hernick**, Ed **Landing**, and Christopher **Berry***
The Oldest Trees

9:20 AM ***Dineen**, Robert J.*
Late Pleistocene–Holocene Geologic History of the Albany, NY Area

9:40 AM ***Miller**, Norton G.*
Habitat of Death of the Hyde Park, New York, Mastodon and other Mastodons in the Great Lakes Region

10:00 AM **Break**

10:20 AM ***Teale**, Chelsea and Norton G. **Miller***
What Plants did Mastodons Eat?

10:40 AM ***Spear** , Ray W., Les C. **Cwynar**, Joshua **Kurek**, Katrina **Button**, Katherine **Mycek**, and Chelsea **Teale***
Early Holocene Reforestation of Mountain Slopes of the Northeast

11:00 AM ***Peteet**, Dorothy M. and Dee **Pederson***
Hudson River Tidal Marsh Communities—The Last Millennium of Change

11:20 AM ***LaDuke**, Thomas C. and Stephen P. **Niedzwiecki***
An Examination of Skeletal Morphology in *Marmota monax* Following the Wisconsin Glaciation

11:40 AM ***Chiment**, John J., Darren **Dale**, Thomas R. **Lake**, Peter **Revesz**, and Richard M. **Wheeler***
Trace Element Analysis of Northeastern Lithic Artifacts: Chert and Flint

12:00 PM **Lunch**

Amphibians

Thursday, April 20, 2006, Meeting Room 3
Contributed Oral Session

Moderator: *Peter K. Ducey (Biology Department, SUNY Cortland, Cortland, NY)*

1:20 PM ***Malaret**, Luis, Gary **Wade**, Monika **Szymurska**, Rachel **Regeczi**, Dianne **Rocheleau,** and Marla **Emery***
Impact of Silvicultural Practices on Leaf Litter Amphibians in the Adirondacks

1:40 PM ***Breisch**, Alvin R. and Michael **Kallaji***
Change in Mudpuppy Population Structure Following Lampricide Treatment

2:00 PM ***Pehek**, Ellen and Susan **Stanley***
Red-backed Salamander Distribution in an Urban Park in Northern Manhattan

2:20 PM ***Peterson**, Allen and Dana **Peterson***
New York Natural Heritage Program Survey of Southern New York State for the Long-tailed salamander (*Eurycea longicauda*)

2:40 PM ***Titus**, Valorie R., Dale M. **Madison**, and Timothy M. **Green***
Movements of Adult, Metamorphic, and Translocated Metamorphic Tiger Salamanders on Long Island

3:00 PM **Poster Session**

Ecological Status and Recovery of Acidified Adirondack Surface Waters

Thursday, April 20, 2006, Meeting Room 4
Organized Symposium

Organizers: *Charles W. Boylen (Darrin Fresh Water Institute and Department of Biology, Rensselaer Polytechnic Institute, Troy, NY) and Clifford A. Siegfried (New York State Museum, Albany, NY)*
Moderator: *James W. Sutherland (NYS Department of Environmental Conservation, retired, Nantucket, MA)*

8:20 AM ***Nierzwicki-Bauer**, Sandra A., James W. **Sutherland**, and Charles W. **Boylen***
Overview of Three Decades of Change in the Chemistry and Biota of Brooktrout Lake

8:40 AM ***Eichler**, L.W. and C.W. **Boylen***
Aquatic Plants as Indicators of Ecosystem Recovery from Acidification

9:00 AM ***Siegfried**, Clifford A.*
Comparison of Zooplankton Community Dynamics in Brooktrout Lake; 1987 and 2005; Is This Acidification Recovery?

9:20 AM ***Kolozsvary**, Mary Beth and Clifford A. **Siegfried***
Nearshore and Deepwater Benthos Communities of Brooktrout Lake 1987 and 2005—A "Recovering" Clear Water Acid Lake

9:40 AM ***Farrell**, Jeremy L., James P. **Harrison**, Charles W. **Boylen**, and Sandra **Nierzwicki-Bauer***
Hydroacoustic Assessment of Brooktrout Lake

10:00 AM **Break**

Ecological Status and Recovery of Acidified Adirondack Surface Waters (cont.)

Thursday, April 20, 2006, Meeting Room 4
Organized Symposium

Moderator: *Charles W. Boylen (Darrin Fresh Water Institute and Department of Biology, Rensselaer Polytechnic Institute, Troy, NY)*

10:20 AM ***Shaw**, William H., James W. **Sutherland**, Charles W. **Boylen**, and Sandra A. **Nierzwicki-Bauer***
The Zooplankton Community Index as a Tool for Measuring Zooplankton Recovery in Chemically Recovering, Acidified, Adirondack Lakes

10:40 AM ***Wolfe**, James, Robert **Erbelding**, Daniel **Miller**, Seth **Nichols**, and Jason **Shambach***
Nutrients and Trophic Status of Star Lake in the Northwestern Adirondack Park

11:00 AM ***Harrison**, James P. and Charles W. **Boylen***
Seasonal Anoxic Water Incursions by Pelagic Piscivores: Pelagic Food Web Modeling

11:20 AM ***Lawrence**, Gregory B., Karen M. **Roy**, Barry P. **Baldigo**, Howard A. **Simonin**, Susan B.**Capone**, James S. **Sutherland**, and Sandra. A. **Nierzwicki-Bauer***
Acid Rain Effects on Western Adirondack Stream Chemistry

11:40 AM ***Baldigo**, Barry P., Gregory **Lawrence**, and Howard **Simonin***
Persistent Brook Trout Mortality in Acidified Streams of the Southwestern Adirondack Mountains

12:00 PM **Lunch**

Aquatic Ecology

Thursday, April 20, 2006, Meeting Room 4
Contributed Oral Session

Moderator: *Robert A. Daniels (New York State Museum, Albany, NY 12230)*

1:00 PM ***Schmidt**, Robert E. and Erik **Kiviat***
Discovery of a Parthenogenetic Clam Shrimp in New York and New Jersey

1:20 PM ***Strayer**, David L. and Heather M. **Malcom***
Long-term Decline (and Recovery?) of Native Bivalves in the Hudson River

1:40 PM ***Gilman**, Bruce A.*
Twenty Years of Research in the Aquatic Plant Communities of Honeoye Lake

2:00 PM ***Rachlin**, Joseph W., Barbara E. **Warkentine**, and Antonios **Pappantoniou***
Bronx River Ichthyofaunal Zonation, as Viewed through a Parsimony Algorithm's Lens

2:20 PM ***Brooks**, Meriel J.*
Drift of Larval Fish in the Poultney River

2:40 PM ***Schmidt**, Robert E.*
Distribution and Abundance of the American Eel in a Hudson River Tributary

3:00 PM **Poster Session**

Direct and Indirect Effects of Roads on Amphibians and Reptiles

Friday, April 21, 2006, Meeting Room 1
Organized Symposium

Organizer: *Mary Beth Kolozsvary on behalf of the Northeast Partners in Amphibian and Reptile Conservation (NEPARC)*
Moderator: *Mary Beth Kolozsvary (New York State Biodiversity Research Institute, New York State Museum, Albany, NY)*

8:20 AM ***Confer**, John, Anthony **Parisi***, Kyle **Block***, and Mark **Hager****
Monitoring Amphibian Mortality During Migration: Tompkins Co. NY

8:40 AM ***Breisch***, Alvin R. and Mark **Fitzsimmons***
Observations from 6 Years of Monitoring New York State's First Amphibian Tunnel

9:00 AM ***Woltz***, Hara W. and James P. **Gibbs***
Herpetofauna Road Crossing Structures—Informing Design through Behavioral Analysis

9:20 AM ***Mazerolle***, Marc J., Matthieu **Huot**, and Mireille **Gravel***
Amphibian Behavior in Response to Car Traffic

9:40 AM ***Karraker***, Nancy E. and James P. **Gibbs***
Impacts of De-icing Salt on the Demography of Vernal Pool-breeding Amphibians

10:00 AM **Break**

Direct and Indirect Effects of Roads on Amphibians and Reptiles (cont.)

Friday, April 21, 2006, Meeting Room 1
Organized Symposium

Moderator: *Alvin R. Breisch (Division of Fish, Wildlife, and Marine Resources, New York State Department of Environmental Conservation, Albany, NY)*

10:20 AM ***Paton***, Peter W.C. and Robert S. **Egan***
Multi-scale Habitat Characteristics of Wood Frogs and Spotted Salamanders across an Urbanization Gradient

10:40 AM ***Langen***, Tom A.*
Landscape Predictors of Hotspots of Herpetofauna Road Mortality along a Highway Network

11:00 AM ***Beaudry***, Frederic, Phillip **deMaynadier**, and Malcolm L. **Hunter***
Road Mortality Risk for Spotted and Blanding's Turtles in Maine: Progress Report

11:20 AM ***Compton***, Bradley W., Kevin **McGarigal**, and Paul R. **Sievert***
Turtles in Sprawlville: Landscape Models for Strategic Conservation in Massachusetts

11:40 AM ***Baldwin***, Robert F. and Stephen C. **Trombulak***
Forecasting Public Roads in the Settled Landscapes of the Northern Appalachian/ Acadian Ecoregion

12:00 PM **Lunch**

Turtles—Session I

Friday, April 21, 2006, Meeting Room 1
Contributed Oral Session

Moderator: *Glenn Johnson (Biology Department, SUNY Potsdam, Potsdam, NY)*

1:20 PM ***Haley**, Richard D.*
Summer Habitat and Microhabitat Choice by Wood Turtles (*Clemmys insculpta*)

1:40 PM ***Jones**, Michael T. and Paul R. **Sievert***
Adult Mortality in Rural Wood Turtle (*Glyptemys insculpta*) Populations

2:00 PM ***Bottini**, Michael J.*
Spotted Turtle (*Clemmys guttata*) Use of Mosquito Control Ditches

2:20 PM ***Jaycox**, Jesse W., Alvin R. **Breisch**, and Paul G. **Novak***
Southeastern New York Bog Turtle and Spotted Turtle Monitoring

2:40 PM ***Kiviat**, Erik, Tanessa **Hartwig**, Gretchen **Stevens**, and Heidi **Bock***
Ten-year Study of Wetland and Upland Habitats Constructed for Blanding's Turtle

3:00 PM **Break**

Turtles—Session II

Friday, April 21, 2006, Meeting Room 1
Contributed Oral Session

Moderator: *Glenn Johnson (Biology Department, SUNY Potsdam, Potsdam, NY)*

3:20 PM ***Rosenbaum**, Peter A. and Andrew P. **Nelson***
Finding Wright's Westbury

3:40 PM ***Widrig**, Amanda L. and Russell L. **Burke***
Nest Site Choice and Nest Temperatures in Diamondback Terrapins

4:00 PM ***Karrmann**, David E., Amy **Lee**, William C. **Cerbone**, Adela **Effendy**, Man Nga **Chow**, and Ferdous **Zannat***
Differential Habitat Selection in *Chrysemys picta* and *Chelydra serpentina* Metapopulations

4:20 PM ***Utter**, James, Jamie **Balleau**, Michael **Echevarria**, Beverly **Leon**, Cheryl **Ryder**, and Walter **Soto***
Bog Turtle (*Clemmys muhlenbergii*) Habitat Use in Two Contrasting Wetland Landscapes

4:40 PM ***Willey**, Lisabeth L. and Paul R. **Sievert***
Ecology of Box Turtles in Central Massachusetts

Avian Distribution and Ecology

Friday, April 21, 2006, Meeting Room 2
Contributed Oral Session

Moderator: *Jeffrey D. Corser (New York Natural Heritage Program, Albany, NY)*

8:20 AM ***Harper**, Lee H. and Kevin J. **McGrath***
The Common Tern Habitat Improvement Project: Helping Restore a Threatened Species

8:40 AM ***Kenow**, Kevin, David **Adams**, Nina **Schoch**, David **Evers**, William **Hansen**, Rick **Godin**, Kate **Taylor**, Andrew **Major**, Michale **Glennon**, and Fred **Realbuto***
Migration Patterns and Wintering Range of Common Loons in the Northeastern United States

9:00 AM ***Schoch**, Nina, Amy K. **Sauer**, Rick **Godin**, Michale **Glennon**, David J. **Adams**, John W. **Ozard**, David **Evers**, David **Yates**, Fredrik **Realbuto**, and Kevin **Kenow***
Science on the Fly! Loon Migration: Linking People and the Environment

9:20 AM ***Spilman**, Carolyn, A., William F. **Porter**, and Nina **Schoch***
Effects of Lakeshore Development on Common Loon Reproductive Success

9:40 AM ***Ross**, Angelena M., Glenn **Johnson**, and James P. **Gibbs***
Evidence for Spruce Grouse Decline in Boreal Peatlands of the Adirondack Mountains

10:00 AM **Break**

Avian Distribution and Ecology (cont.)

Friday, April 21, 2006, Meeting Room 2
Contributed Oral Session

Moderator: *Kimberley Corwin (New York State Department of Environmental Conservation, Albany NY)*

10:20 AM ***Schneider**, Kathryn J.*
Update on the Status and Distribution of Short-eared Owls in New York State

10:40 AM ***Wells**, Alan W., W. Charles **Nieder**, Bryan L. **Swift**, Kelli A. **O'Connor**, and Carol A. **Weiss***
Marsh Breeding Bird Survey in the Hudson River Estuary

11:00 AM ***Hames**, Ralph S., James D. **Lowe**, and Kenneth V. **Rosenberg***
Acid Rain, Mercury Deposition, and Contamination of Common Bird Species in New York

11:20 AM ***Schoch**, Nina, David **Evers**, Melissa **Duron**, Michale **Glennon**, Howard **Simonin**, Charles **Driscoll**, Amy K. **Sauer**, and John W. **Ozard***
Long-term Assessment of Mercury through Sampling of Loons, Fish, Water, and Sediment

11:40 AM ***Smith**, Charles R.*
Bird Conservation in New York State—Are We Meeting the Challenge?

12:00 PM **Lunch**

Colonial Waterbirds in Northeastern North America—Monitoring, Research and Management Actions in the 2000s

Friday, April 21, 2006, Meeting Room 2
Organized Symposium

Organizers: *Susan B. Elbin (NY Bioscape Initiative, Wildlife Trust, New York, NY) and D.V. Chip Weseloh (Canadian Wildlife Service, Downsview, Ontario, Canada)*
Moderator: *Susan B. Elbin (NY Bioscape Initiative, Wildlife Trust, New York, NY)*

1:20 PM ***Parsons**, Katharine C. and Stephanie R. **Schmidt***
Monitoring Pesticide Effects in Wading Birds in Eastern US

1:40 PM ***Newman**, Scott H. and Veronica M. **Padula***
Health Assessment of Black-crowned Night Herons in New York Harbor Estuary

2:00 PM ***Adams**, David, James **Farquhar**, Irene **Mazzocch**i, Lance **Clark**, Mark **Kandel**, Connie **Adams**, Joe **Racette**, Mike **Wasilco**, Mark **Carrara**, Allen **Gosser**, Richard **Chipman** Adam **Duerr**, David **Capen**, Jeremy **Coleman**, and Milo **Richmond***
A New York State Regional Look at Double-crested Cormorant Colonies

2:20 PM ***Weseloh**, D.V. Chip, Irene **Mazzocchi**, and Lee **Harper***
Breeding Populations of Double-crested Cormorants on the Upper St. Lawrence River, 1991–2005

2:40 PM ***Danoff-Burg**, James A.*
Double Crested Cormorant Colonies May Depress Litter Biodiversity: A Pilot Study

3:00 PM **Break**

Colonial Waterbirds in Northeastern North America—Monitoring, Research and Management Actions in the 2000s (cont.)

Friday, April 21, 2006, Meeting Room 2
Organized Symposium

Moderator: *D.V. Chip Weseloh (Canadian Wildlife Service, Downsview, Ontario, Canada)*

3:20 PM ***Elbin**, Susan B., Andrew **Bernick**, Katharine **Parsons**, Paul K**erlinger**, and Yigal **Gelb***
Nearly Thirty Years of Wading Bird Nesting in the New York Harbor

3:40 PM ***Rosenblatt**, Daniel, Michael **Wasilco**, and Michele **Gibbons***
Recent Trends in New York State Nesting Shorebirds

4:00 PM ***Corser**, Jeffrey D., David J. **Adams**, and Irene M. **Mazzocchi***
Population Dynamics and Conservation of Black Terns (*Chlidonias niger*) in New York State, 1989–2004

4:20 PM ***Harper**, Lee H., Connie J. **Adams**, and Mike **Promowicz***
Gravel Boxes Provide New Nesting Habitat and Increase Productivity in Common Terns

Floristic Studies

Friday, April 21, 2006, Meeting Room 3
Contributed Oral Session

Moderator: *Troy W. Weldy (New York Natural Heritage Program, Albany, NY)*

8:20 AM ***Moore**, Gerry and Steven E. **Clemants***
The Changing Flora of the New York Metropolitan Area

8:40 AM ***Tedesco**, Connie, Donna W. **Vogler**, and Adam K. **Ryburn***
Updated Floras of Two Counties in Central New York: Montgomery and Otsego

9:00 AM ***Bradley**, Adam F. and Garrett E. **Crow***
The Flora and Vegetation of Timber Island, Lake Winnipesaukee, New Hampshire

9:20 AM ***Seischab**, Franz K.*
Durand-Eastman Park Arboretum: The Unknown, Forgotten, Ignored Arboretum

9:40 AM ***Jenkins**, Jerry C.*
High-diversity Dry-rich Forests in the West Champlain Hills

10:00 AM **Break**

Invertebrates

Friday, April 21, 2006, Meeting Room 3
Contributed Oral Session

Moderator: *Randy J. Mercurio (Division of Invertebrate Zoology, American Museum of Natural History, New York, NY)*

10:20 AM ***Bried**, Jason T., Timothy H. **Tear**, Rebecca R. **Shirer**, Christopher L. **Zimmerman**, and Neil A. **Gifford***
Monitoring Habitat Quality for Karner Blue Butterfly Recovery

10:40 AM ***Mercurio**, Randy J.*
An Overview of Centipedes (Chilopoda) in New York State, and North America

11:00 AM ***Hager**, Barbara J.*
Betula populifolia Phenology and *Fenusa pusilla* Usage and Success

11:20 AM ***Reznik**, Joseph W.*
Collembola of New York: What Do We Really Know?

11:40 AM ***Dirig**, Robert*
Rare Northern Butterflies of the Northeast

12:00 PM **Lunch**

Dragonflies and Damselflies: Species Studies and Surveys

Friday, April 21, 2006, Meeting Room 3
Organized Symposium

Organizer and Moderator: *Paul G. Novak (New York Natural Heritage Program, Albany, NY)*

1:20 PM ***Gregoire****, John, Sue* ***Gregoire****, and Paul* ***Novak****
Breeding Populations of the Comet Darner (*Anax longipes*) in Upstate New York

1:40 PM ***Trybula****, Jan*
Adult *Ladona deplanata* Partition Habitat by Sex and Reproductive Maturity

2:00 PM ***Audet****, Gerald N. and Michael H.* ***Blust***
Odonata of the Poultney River

2:20 PM ***Novak****, Paul and Charlene* ***Houle***
The New York Dragonfly and Damselfly Survey: First Year Progress and Results

2:40 PM ***Haley****, Richard D., Larry* ***Federman****, and Andrew J.* ***Mackie***
Audubon Center Participation in New York Dragonfly and Damselfly Survey

3:00 PM **Break**

Dragonflies and Damselflies: Conservation

Friday, April 21, 2006, Meeting Room 3
Organized Symposium

Organizer and Moderator: *Paul G. Novak (New York Natural Heritage Program, Albany, NY)*

3:20 PM ***Bried****, Jason T.*
Integrating Odonatology with Aquatic and Wetland Conservation Science

3:40 PM ***Brown****, Virginia A.*
Dragonflies and Damselflies of Rhode Island: Species Diversity, Land Use, and Conservation

4:00 PM ***Hunt****, Pamela*
Assessing the Conservation Status of Odonates in New Hampshire
(Late Addition—See Addendum for Abstract)

4:20 PM ***Loose****, Jennifer L.*
Mapping the Footprint of Rare Dragonflies and Damselflies in Massachusetts

Urban and Wilderness Mammals

Friday, April 21, 2006, Meeting Room 4
Contributed Oral Session

Moderator: *Roland W. Kays (New York State Museum, Albany, NY)*

8:00 AM ***Ver Straeten**, Charles A.*
Winter Habits of Porcupines (*Erethizon dorsatum*), Helderberg Plateau, Albany County, New York

8:20 AM ***Rulison**, Eric L.*
Nuisance Mammal Survey of Gateway National Recreation Area, New York and New Jersey

8:40 AM ***Ekernas**, L. Stefan and Katherine J.* ***Mertes***
Patch Size and Habitat Effects on Small Mammals around New York City

9:00 AM ***LaPoint**, Scott D., Mark V.* ***Lomolino****, and Roland W.* ***Kays***
Mammalian Road Crossing Patterns along a Major Highway at the Landscape Scale

9:20 AM ***Kays**, Roland W., Matthew E.* ***Gompper****, and Justina C.* ***Ray***
Noninvasive Surveys and Density Estimation for Fisher and Coyote

9:40 AM ***Garneau**, Danielle E. and Eric* ***Post***
Spatio-temporal Habitat Partitioning among Three Sympatric Predators in a One-prey System

10:00 AM **Break**

Biodiversity of the Hudson Highlands

Friday, April 21, 2006, Meeting Room 4
Organized Symposium

Organizer and Moderator: *James A. Beemer (U.S. Army Garrison–West Point, NY, West Point, NY)*

10:20 AM ***Beemer**, James A.*
Edgar A. Mearns: Visionary of Hudson Highlands Biodiversity

10:40 AM ***Barbour**, James G. (Spider)*
Butterflies and Moths of the West Point Military Reservation

11:00 AM ***Yrizarry**, John C.*
Natural History of Sterling Forest State Park

11:20 AM ***Barbour**, James G. (Spider)*
Rare Plants of the West Point Military Reservation

11:40 AM ***Werier**, David.*
Paying Close Attention in the Field: Lessons from *Carex* Section *Acrocystis*

12:00 PM **Lunch**

1:20 PM ***Schmidt**, Robert E.*
Upland Freshwater Fishes in the Hudson Highlands

1:40 PM ***Stechert**, Randy and James* ***Beemer***
The Hudson Highlands: A Refuge for the Threatened Timber Rattlesnake (*Crotalus horridus*)

2:00 PM ***Breisch**, Alvin R., John W.* ***Ozard****, and Ariana N.* ***Breisch***
Herpetofaunal Diversity in the Hudson Highlands of New York

Timber Rattlesnakes

Friday, April 21, 2006, Meeting Room 4
Contributed Oral Session

Moderator: *Jesse W. Jaycox (New York Natural Heritage Program, Albany, NY)*

3:20 PM ***Hecht**, Jack H., Jaak S. **Van den Sype**, and Randy **Stechert***
Dispersal of Timber Rattlesnakes to Shedding Sites, an Indicator of Summer Range?

3:40 PM ***McGowan**, Edwin M., Kathy **Michell**, and Jesse W. **Jaycox***
Non-surgical Attachment of External Transmitters on Timber Rattlesnakes for Monitoring Short-term Movements

4:00 PM ***Brown**, William S. and Marc **Kery***
Survival of Lab-born and Field-born Timber Rattlesnakes (*Crotalus horridus*): Implications for Conservation

Biodiversity Conservation in Practice

Friday, April 21, 2006, Meeting Room 5
Contributed Oral Session

Moderator: *Neil A. Gifford (Albany Pine Bush Preserve, Albany, NY)*

8:00 AM ***Oscarson**, Damon B. and Aram J.K. **Calhoun***
Implementing Best Development Practices for Vernal Pools in Four New England Towns

8:20 AM ***Bell**, Kristen E. and Gretchen **Stevens***
Habitat Mapping as a Tool for Biodiversity Conservation

8:40 AM ***Heady**, Laura T. and Gretchen **Stevens***
Training Local Decision-makers: A Habitat Approach to Biodiversity Conservation

9:00 AM ***Phu**, Linh D.*
Funding Habitat Conservation Projects for Species at Risk in Maryland

9:20 AM ***Rooks**, Mark, Michale **Glennon**, and Heidi **Kretser***
Biological Impacts of Low Density Subdivision in the Adirondack Park

Biodiversity Inventories, Mapping, and Modeling

Friday, April 21, 2006, Meeting Room 5
Contributed Oral Session

Moderator: *Timothy G. Howard (New York Natural Heritage Program, Albany, NY)*

10:20 AM ***Rykken**, Jessica J. and Brian D. **Farrell***
Boston Harbor Islands All Taxa Biodiversity Inventory

10:40 AM ***Milewski**, Craig L., Stacy **McNulty**, and Ray **Curran***
The Adirondack All-taxa Biodiversity Inventory Initiative

11:00 AM ***Howard**, Timothy G., Troy W. **Weldy**, Heidi J. **Krahling**, and Jesse W. **Jaycox***
Using Species and Natural Community Distribution Models to Predict Biodiversity Hotspots

11:20 AM ***Weldy**, Troy and David **Werier***
The New York Flora Atlas: More than a Distribution Atlas

11:40 AM ***Mickelson**, John G. Jr.*
Expansion of the USGS National Biological Information Infrastructure for the Northeastern U.S.

12:00 PM **Lunch**

Forest Ecology

Friday, April 21, 2006, Meeting Room 5
Contributed Oral Session

Moderator: *George R. Robinson (Department of Biological Sciences, University at Albany, Albany, NY)*

1:40 PM ***Mihuc**, Timothy, Thomas **Woodcock**, Edwin **Romanowicz**, Eileen **Allen**, Robert **Fuller**, David **Franzi**, Janet **Mihuc**, Celia **Evans**, James **Allen**, and Chris **Cirmo***
Ecosystem Integrity in Adirondack Upland Headwater Catchments: A Comparison of Reference and Logged Catchments

2:00 PM ***Putnam**, Nancy J., Melissa Dow **Cullina**, Kasey **Rolih**, Brad **Compton**, and John J. **Scanlon***
Predicting Rich Mesic Forests on Massachusetts State Wildlife Lands

2:20 PM ***Bellemare**, Jesse, Mark **Vellend**, Monica A. **Geber**, Kim **Sparks**, Charles **Mohler**, and Peter L. **Marks***
Phylogenetic Structure of Woody Plant Communities in Central New York

2:40 PM ***Root**, Heather T. and Gregory G. **McGee***
Epiphytic Lichen Community Response to Forest Management on *Acer saccharum* in the Adirondack Mountains of New York

3:00 PM **Break**

Post-disturbance Ecology

Friday, April 21, 2006, Meeting Room 5
Contributed Oral Session

Moderator: *Gregory G. McGee (Faculty of Environmental and Forest Biology, SUNY College of Environmental Science and Forestry, Syracuse, NY)*

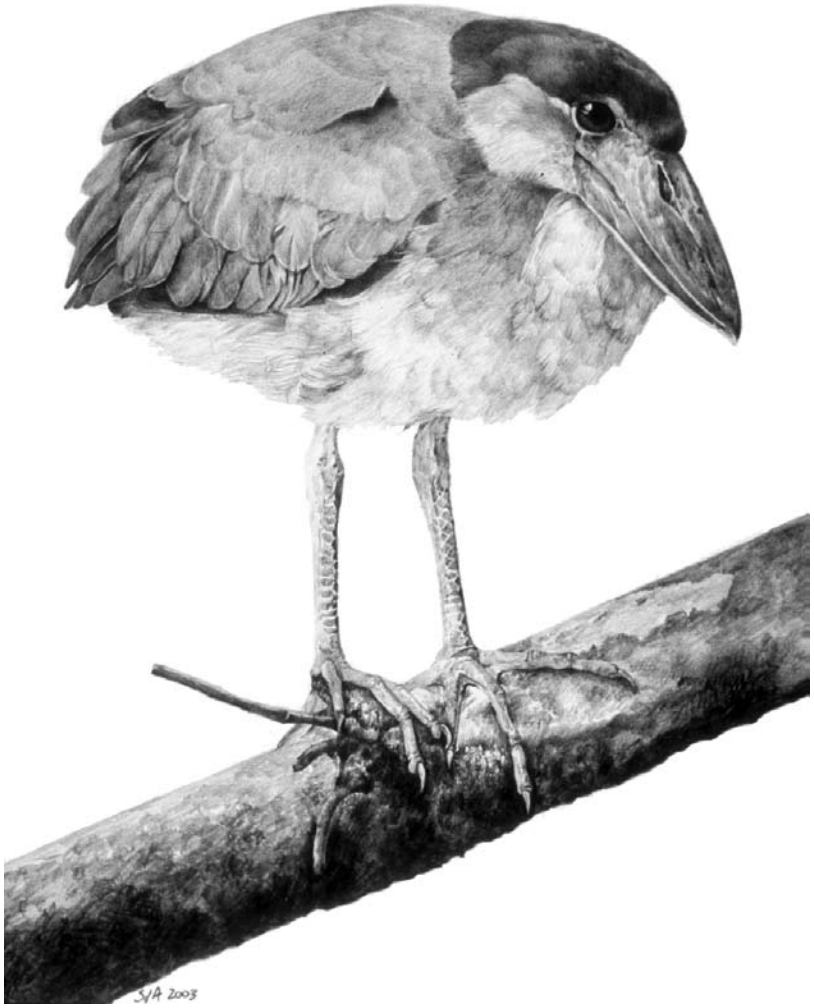
3:20 PM ***McGee**, Gregory G.*
Vascular Plant Community Recovery In Post-Cultivation Second-Growth Forests Across New York

3:40 PM ***Vispo**, Conrad and Claudia **Knab-Vispo***
The Native Flora and Fauna of Some Farms in Columbia County, NY

4:00 PM ***Flinn**, Kathryn M.*
Fern Colonization of Post-Agricultural Forests in Central New York

4:20 PM ***Griffin**, Jacob M., Brent C. **Mellen**, Gary M. **Lovett**, Mary A. **Arthur**, and Ross D. **Fitzhugh***
Substrate and Topographic Controls on Catskill Forest Composition: Implications for Disturbance Recovery

4:40 PM ***Eallonardo** Jr., Anthony S. and Donald J. **Leopold***
Alleviation of Restoration Thresholds on the Solvay Waste Beds, NY



Boat-billed Heron (Cochlearius cochlearius)
Purchase Award Winner (1 of 5) from Focus on Nature VIII
Artist: Sue de Learie Adair, Schenectady, NY
Graphite on paper (12 × 15 inches, Bienfang Bristol, 100 lb.), 2003

Abstracts for Oral Presentations

A New York State Regional Look at Double-crested Cormorant Colonies

***Adams**[*,1], David, James **Farquhar**[1], Irene **Mazzocchi**[1], Lance **Clark**[1], Mark **Kandel**[1], Connie **Adams**[1], Joe **Racette**[1], Mike **Wasilco**[1], Mark **Carrara**[2], Allen **Gosser**[2], Richard **Chipman**[2] Adam **Duerr**[3], David **Capen**[3], Jeremy **Coleman**[4], and Milo **Richmond**[4] ([1]Bureau of Wildlife, New York State Department of Environmental Conservation, Albany, NY 12233; [2]USDA APHIS Wildlife Services, Castleton, NY; [3]University of Vermont, Burlington, VT; [4]Cornell University, Ithaca, NY)*

Double-crested Cormorants (*Phalacrocorax auritus*) were first reported breeding in New York State in 1945. Cormorants spread into the Great Lakes from the west, occurring on Lake Superior in 1913, Lake Michigan and Huron in the 1930s, and finally to Lake Ontario and Erie. Populations increased steadily and by the 1950s control was required. The Great Lakes population declined from a peak of 900 nests in 1950 to 114 in 1973, associated with high levels of DDE and PCBs. As antipollution programs were enacted cormorants made a remarkable recovery. In Lake Ontario, Little Galloo Island was occupied in 1974 (22 nests). Nest counts increased 35% per year between the mid 1970s and mid 1990s (8,410 nests). This expanding population colonized new nesting sites including Lake Champlain in 1981 (1 nest), Oneida Lake in 1984 (1 nest), and the Niagara Frontier in 1992 (7 nests). The Atlantic coast population has also increased, moving southward from the Maritime Provinces to Maine and Massachusetts, and eventually to Long Island (Fishers Island 1977). Increasing public concern for cormorant populations and their impacts on sport fisheries, island habitats, and other colonial waterbirds, prompted the development of cormorant management objectives for Lake Ontario and Oneida Lake in 1994. As a result, the Department has altered fish stocking methods, prevented cormorant from nesting on select islands, and controlled colony growth. A 2003 federal resource depredation order has allowed additional flexibility in the management of Double-crested Cormorants. The total summer population estimate of cormorants in New York State is ~43,000 (10,500 breeding pair). Approximately 2,500 nesting pairs occur in coastal areas.

Odonata of the Poultney River

***Audet**[*], Gerald N. and Michael H. **Blust** (Department of Natural Science and Mathematics, Green Mountain College, Poultney, VT 05764)*

From September to November 2005, a study was conducted to find, identify, and map Odonate nymphs in the Poultney River of Vermont and New York. Samples were taken at various sites, from the headwaters to approximately twenty-five miles downstream, in an effort to identify the different species of Odonata that occupy the main waterway and its tributaries. Habitats included small rocky brooks, medium sized rocky rivers, and slow moving shallow reaches with silt and clay. Over three hundred individual nymphs were collected, representing more then twenty genera. Portions of the Poultney River form the border between NY State and Vermont. *Enallagma divagans*, which had previously been undocumented in the state of Vermont or nearby counties of NY, was found in this border stretch. Diversity and distribution of species will be discussed.

Persistent Brook Trout Mortality in Acidified Streams of the Southwestern Adirondack Mountains

***Baldigo**[*,1], Barry P., Gregory **Lawrence**[1], and Howard **Simonin**[2] ([1]U.S. Geological Survey, New York Water Science Center, Troy, NY 12180; [2]New York State Department of Environmental Conservation, Rome Field Station, Rome, NY 13440)*

Water chemistry, discharge, and mortality of hatchery brook trout (*Salvelinus fontinalis*) were characterized in six streams in the southwestern Adirondack Mountains during spring 2001, 2002, and 2003 and compared with mortality from earlier toxicity tests (1984–85, 1988–90, and 1997) to assess contemporary relations between acidification and trout mortality. Water quality and mortality of young-of-year brook trout were evaluated during 30-day exposure periods from mid-April to late May during 2001, 2002, and 2003. Trout mortality in these tests ranged from 0 to 100 percent and varied among streams and years, but was comparable to mortality observed during earlier tests, which suggests that stream water quality in the region has not changed substantially since 1984. Al_{im} concentrations greater than 2 and 4 μmol L^{-1} were closely correlated with low and high rates of brook trout mortality. Exposure durations of 2 to 4 days to Al_{im} concentrations greater than 4 μmol L^{-1} commonly resulted in 50 to 100% mortality. The extended periods (as long as 6 months) during which Al_{im} concentrations exceeded 2 and 4 μmol L^{-1} in one or more study streams and the low tolerance of many other fish species to acid and elevated Al_{im} concentrations indicate the potential for injury to fish communities in poorly buffered streams of the Northeast is high. The scarcity of fish data from most headwater streams of the region, however, precludes a thorough analysis of the extent and severity that fish communities may be harmed by episodic acidification in the Adirondack Mountains.

Forecasting Public Roads in the Settled Landscapes of the Northern Appalachian/Acadian Ecoregion

***Baldwin**[*,1], Robert F. and Stephen C. **Trombulak**[2] ([1]Two Countries/One Forest, c/o School of Forest Resources, University of Maine, Orono, Maine 04469; [2]Department of Biology and Program in Environmental Studies, Middlebury College, Middlebury, VT 05753)*

Existing roads in settled landscapes cause severe mortality in some populations of amphibians and reptiles and have numerous indirect effects on their habitats. Most of the Northern Appalachian/Acadian ecoregion is facing land use change in coming decades. Forecasts of the future road network under alternative population growth scenarios are useful surrogates for anticipating ecological effects of human settlement and will assist conservation organizations to guide protection efforts. We investigated growth of public roads in the State of Maine over a 17-year historical period, and then use the best-selected (AIC) logistic regression model to forecast spatial probability of future roads. Nearly 2,000 km of new roads were constructed in settled landscapes in Maine 1986–2003, influencing 37,000 ha within an ecological road effect zone of 200m. The majority (93.5%) of the new roads performed local functions and were short (<1/3 km in length), characterized as cul de sacs and dead ends; in other words, were residential roads typical of sprawl. The best selected logit model (dwelling density (+), elevation (-), distance to urban area (+), distance to existing primary/secondary highway (+)) captured 84% of reserved new road points in Maine and only 27% of random points at the >0.5 probability level. The model forecast nearly 0.5 million km of new, residential public roads in the Northern Appalachian/Acadian ecoregion for the next two decades, suggesting that cumulative effects of road network expansion are a serious region-scale threat to amphibians and reptiles.

Butterflies and Moths of the West Point Military Reservation

***Barbour**[*], James G. (Spider) (Ecological Consultant to West Point Military Academy, West Point, NY 10996 and New York State Museum, Albany, NY 12230)*

The author surveyed for butterflies and moths on lands of the West Point Military Reservation in four growing seasons (butterflies in 1995, 1996, and 2002; moths in 1999 and 2002). These surveys recorded 476 species of lepidoptera, 74 butterflies and 402 moths. The documented lepidopteran fauna included 8 butterfly species and 3 moth species listed as rare in New York by the New York Natural Heritage Program. Counts from visual observations and trapping samples in both moths and butterflies showed numbers of individuals to be relatively low, but species diversity to be high compared to lists of species recorded from other locations in southeastern New York.

Rare Plants of the West Point Military Reservation

***Barbour**[*], James G. (Spider) (Ecological Consultant to West Point Military Academy, West Point, NY 10996 and New York State Museum, Albany, NY 12230)*

From 1990 to 2000, floristic and rare plant surveys on the West Point Military Reservation have recorded 80 species of native plants listed as rare in New York State by the New York Natural Heritage Program. The author participated in the floristic survey of 1992, and performed rare plant surveys in 1994, 1997, 2000, and 2003. At least one additional rare species was added during each of the four survey years, the greatest number, 5, in 2003. Due to changes in rarity status, the number of Heritage-listed rare plant species at West Point presently stands at 64. This is approximately 54% of the total number (119) of Heritage-listed rare plant species recorded for the New York Hudson Highlands. Rare plant species at West Point were found across the landscape in a great variety of habitats, from streams, ponds and wetlands to forested slopes and summit barrens.

Road Mortality Risk for Spotted and Blanding's Turtles in Maine: Progress Report

***Beaudry**[*,1], Frederic, Phillip **deMaynadier**[2], and Malcolm L. **Hunter**[1] ([1]Department of Wildlife Ecology, University of Maine, Orono, ME 04473; [2]Maine Department of Inland Fisheries and Wildlife, Bangor, ME 04401)*

Spotted and Blanding's turtles share life-history traits that make their populations vulnerable to small increases in adult mortality. Their frequent overland trips to reach isolated wetlands, coupled with increased development in southern Maine, puts these turtles at risk through roadkill. In order to mitigate road mortality we need to know the characteristics of the turtles' terrestrial movements. We have been radio-tracking and thread-tracking spotted and Blanding's turtles to determine habitat selection, terrestrial movement timing, path and tortuosity. Terrestrial movements are not distributed equally over the turtles' active season, but concentrated during peak periods. Most terrestrial movements for Blanding's turtles occur from mid-April to early July. Spotted turtles show their first terrestrial movement peak with the nesting season in June, and a second peak in late summer. Spotted turtles have made, on average, 3.4 terrestrial movements per season (range: 0–9),

and Blanding's turtles 8.5 movements per season (range: 0–18). Terrestrial movements were made following a relatively straight line. These data will be used to model movements, estimate road mortality, and compare the population viability under various conservation management scenarios.

Edgar A. Mearns: Visionary of Hudson Highlands Biodiversity

Beemer, James A. (U.S. Army Garrison–West Point, NY, West Point, NY 10996-1592)*

During the late 1800s, Edgar A. Mearns, a Highland Falls, NY native and U.S. Army surgeon, conducted numerous biological surveys in the Hudson Highlands region of New York State. Although he primarily catalogued vertebrates, Mearns did also document lepidopteran diversity, crustacean diversity, molluscan diversity and the trees, shrubs and woody vines of the region. Faunal collections he made were deposited in the National Museum of the Smithsonian Institution in Washington, DC, while floral collections were deposited in the American Museum of Natural History. Mearns noted that three distinct regional faunal groups were present within his 20 square mile survey area—Carolinian, Canadian, and Alleghanian. Examining the geography and geological history of the region provides insight into what shaped this region's rich biodiversity, both in Mearns' time and today. Mearns' published work in the Bulletin of The American Museum of Natural History (Vol. X, Article XVI) is must reading for anyone interested in the richness of the region.

Protection of the Blanding's Turtle (*Emydoidea blandingii*) at James Baird State Park

Belding[,1], Edwina and Kenneth **Smith**[2] ([1]NYS Office of Parks, Recreation and Historic Preservation, Environmental Management Bureau, Albany, NY 12238; [2]Student Conservation Association Intern, Rochester, NY 14626)*

The Blanding's turtle (*Emydoidea blandingii*) is listed as a threatened species in New York. It is only found along the St. Lawrence River and in Saratoga and Dutchess Counties. James Baird State Park is located in central Dutchess County and contains important habitat areas for this species. The park is 590 acres in size and contains an 18-hole golf course and day use areas. It is surrounded by former farmland undergoing rapid suburbanization. State Parks has used Student Conservation Association interns at the park to monitor the turtle using radio telemetry. This has provided information on population size and characteristics and has helped confirm the location of the most critical habitat areas. The results of four years of monitoring will be presented. Also discussed will be the mitigation measures that were used during construction associated with closure of the former park landfill. The challenges of balancing the protection of this species with recreation and the changing landscape around the park will be discussed.

Habitat Mapping as a Tool for Biodiversity Conservation

Bell, Kristen E. and Gretchen **Stevens** (Hudsonia Ltd., Annandale, NY 12504)*

In their planning, policy-making, environmental reviews, and decision-making, local governments have a direct and lasting influence on patterns of land use and development. Unfortunately, local decision-makers usually lack good information on biological resources at the town-wide scale, making planning for conservation difficult. Hudsonia Ltd., a nonprofit research and education organization, has begun to fill this information gap by systematically mapping ecologically significant habitats in Dutchess County, New York. Using map analysis, aerial photograph interpretation, and extensive field observations, this mapping is done at a much finer scale than most remote sensing analyses, and provides information useful both for town-wide planning and for site-specific environmental reviews. In addition to identifying significant habitats, we delineate recommended conservation zones around each habitat of special importance. These zones are based on the area and habitat requirements of a selected species (or group of species) of conservation concern associated with each habitat. We present this information, along with biodiversity-based conservation priorities and management recommendations, to town agencies and other organizations whose decisions directly affect land use. The maps and accompanying recommendations are valuable for informing municipal agencies, landowners, and developers, and can be readily incorporated into comprehensive planning, open space planning, zoning ordinances, and site plan reviews.

Phylogenetic Structure of Woody Plant Communities in Central New York

***Bellemare**[*,1], Jesse, Mark **Vellend**[2], Monica A. **Geber**[1], Kim **Sparks**[1], Charles **Mohler**[3], and Peter L. **Marks**[1] ([1]Department of Ecology and Evolutionary Biology, Cornell University, Ithaca, NY 14853; [2]Department of Botany and Zoology, University of British Columbia, Vancouver, BC; [3]Department of Crops and Soil Sciences, Cornell University, Ithaca, NY, 14853)*

Related species typically possess similar ecological traits due to recent common ancestry. This observation leads to surprisingly contradictory predictions regarding the expected composition of plant communities. First, closely-related species with similar responses to the abiotic environment are predicted to co-occur due to environmental filtering during community assembly. However, intense competition among species with similar traits and resource requirements may lead to competitive exclusion or niche divergence, resulting in infrequent co-occurrence of closely-related species. To assess the extent to which natural plant communities match these divergent predictions, we examined net relatedness of co-occurring woody plant species in 101 tenth ha plots across a range of forest types in central New York. All native woody species documented in the study area were arrayed on a phylogenetic "supertree" using published phylogenies and the web-based program Phylomatic. For each plot, we counted the number of nodes separating all pairs of co-occurring species on the phylogenetic supertree. The mean of these pairwise values for each plot was compared to a null model distribution to calculate a probabilistic measure of the observed mean phylogenetic distance. Low values of this phylogenetic distance score indicate frequent co-occurrence of closely-related species or phylogenetic "clustering"; high values indicate infrequent co-occurrence of closely-related species or phylogenetic "overdispersion." We found that upland beech-maple forests and low-elevation wetland forests exhibited significant phylogenetic clustering, while higher elevation wetland forests exhibited significant phylogenetic overdispersion. Thus, the relative importance of ecological similarity and competitive interactions in community assembly is apparently different among habitat types.

Spotted Turtle (*Clemmys guttata*) Use of Mosquito Control Ditches

***Bottini**[*], Michael J. (34 Chapel Lane, East Hampton, NY 11937)*

Based on the results of his mark-recapture study of Spotted Turtles (*Clemmys guttata*) on eastern Long Island, John Behler of the Wildlife Conservation Society speculated that Suffolk County Vector Control's ditch maintenance practices were killing and injuring spotted turtles. In the fall of 2004, a radio telemetry study commenced to determine spotted turtles' use of mosquito-control ditches during the winter, spring, and summer seasons, to describe some of the physical and biological characteristics of those ditches used by the turtles, and to survey three other ditched wetlands in Suffolk County for spotted turtles. Fourteen spotted turtles were fitted with radio transmitters and relocated a minimum of once every ten days. A total of 524 relocations were made over the course of the study. Locations were mapped, distances traveled between relocations were measured, and vegetation and temperatures in the immediate vicinity were noted. Salinity and water level fluctuations in the study area were recorded through several tidal cycles. This study revealed a strong preference among spotted turtles for mosquito control ditches (97% of relocations during the winter, 92% during the spring, and 62% during the summer), particularly those ditches containing emergent vegetation (*Typha* spp., *Phragmites communis*, and *Scirpus americanus*). Turtles remained active throughout the winter season, moving an average of 17 meters between relocations (compared to 53 meters/relocation in spring and 38 meters/relocation in summer). One of the three ditched wetlands surveyed revealed spotted turtles. These results pose a management challenge for Suffolk County Vector Control and the NYSDEC.

The Flora and Vegetation of Timber Island, Lake Winnipesaukee, New Hampshire

***Bradley**[*,1], Adam F. and Garrett E. **Crow**[2] ([1]Plant Biology Department, University of New Hampshire, Durham NH 03824; [2]Head of the Plant Biology Department, University of New Hampshire, Durham NH 03824)*

The flora of Timber Island consists of 190 vascular plant species, none of which were listed as rare or endangered; 24 species of bryophytes were also recorded. Abundance and frequency data from 106 plots were analyzed by using a two-way indicator species analysis program (TWINSPAN). The result was the identification of six vegetation cover types: *Pinus strobus – Gaylussacia baccata* CT, *Fagus grandifolia – Ostrya virginiana* CT, *Pinus resinosa – Gaylussacia baccata – Vaccinium angustifolium* CT, *Tsuga canadensis* CT, *Acer rubrum – Dulichium arundinaceum* CT, and Ruderal CT; a narrow Shoreline CT and small, scattered sites of Woodland Vernal Pool CT were recognized based on field observations. A modified Line Intercept Analysis employed to quantify the make up of the forest floor showed that duff and leaf litter covered 74 percent of the island, exposed rock outcrop was calculated at 8 percent, herbaceous plants showed a markedly sparse level of 7 percent. Two indices of similarity were used to compare the island flora with known floras from 3 other islands in Lake Winnipesaukee. The Sørensen's

Index showed 49.7 percent similarity with Bear Island, 51.2 percent for Rattlesnake Island, and 51.8 percent for Three Mile Island. Simple Matching Index results showed higher levels of similarity: Rattlesnake Island 58.3 percent, Bear Island 63.4 percent, and Three Mile Island 53.9 percent. This project is critical to understanding how lake-islands may influence the floristic diversity in forests of New Hampshire.

Observations from 6 Years of Monitoring New York State's First Amphibian Tunnel

***Breisch**[*,1], Alvin R. and Mark **Fitzsimmons**[2] ([1]Division of Fish, Wildlife and Marine Resources, New York State Department of Environmental Conservation, Albany, NY 12233; [2]Albany County Office of Natural Resources, Albany, NY 12207)*

In October 1999, Albany County incorporated a tunnel-barrier fence system into a roadway reconstruction project in an area previously demonstrating significantly high amphibian diversity and abundance and correspondingly high road mortality associated with movements between hibernating, breeding, and foraging sites. The project, which was the first of its kind to be implemented in New York, was designed to limit movements by amphibians and other non-target species onto the road surface while directing movements toward one of two tunnels under the highway. The system design included two concrete box culverts with a bottom surface of native soil traversing the full width of a two-lane county highway. The 0.5 m × 1.2 m tunnel openings are connected by 90± m of permanent, pressure-treated lumber barrier fencing on each side of the roadway. Post-construction monitoring of the project area showed that most amphibian movements had been successfully directed along the barrier fence while movements onto or over the road surface were all but precluded. In an adjacent control area approximately 40% of over 600 individuals observed were roadkill whereas in the tunnel area only 2% of almost 300 individuals observed were roadkills. Monitoring also showed individuals of nine amphibian species and three non-target species entering the tunnels. We will also discuss design, maintenance and other considerations of the project.

Herpetofaunal Diversity in the Hudson Highlands of New York

***Breisch**[*,1], Alvin R., John W. **Ozard**[1], and Ariana N. **Breisch**[2] ([1]Division of Fish, Wildlife, and Marine Resources, New York State Department of Environmental Conservation, Albany, NY 12233; [2]New York Cooperative Fish and Wildlife Research Unit, Cornell University, Ithaca, 14853)*

Edgar A. Mearns made extensive collections of amphibians and reptiles in the Hudson Highlands beginning in the late 1880s. He identified 38 species of herpetofauna in this region, an area comprising just 0.5% of the state. One species reported by Mearns, the mink frog (*Rana septentrionalis*), has not been reported south of the Adirondacks by other investigators. He also provided notes on species abundance and in some cases population trends. Of particular interest, he noted that timber rattlesnakes (*Crotalus horridus*) had become extremely rare in some areas. Modern surveys show that 25% of all known timber rattlesnake dens occur in the Hudson Highlands. About 100 years after Mearns' surveys, the New York Amphibian and Reptile Atlas Project began a ten-year statewide survey to document the distribution of all herpetofauna throughout the state. Southeastern New York, and the Hudson Highlands in particular with 44 species documented by the Herp Atlas, has the highest overall diversity and the highest diversity for salamanders, turtles, snakes and lizards, supporting observations made by Mearns. We will compare Herp Atlas data with observations reported by Mearns. Although approximately 2/3 of the Hudson Highlands is protected land, the exceptional herpetofaunal diversity of this region suggests that efforts to set aside additional land are warranted.

Change in Mudpuppy Population Structure Following Lampricide Treatment

***Breisch**[*], Alvin R. and Michael **Kallaji** (Division of Fish, Wildlife and Marine Resources, New York State Department of Environmental Conservation, Albany, NY 12233)*

Beginning in 1990, we monitored mortality of non-target amphibians following lampricide treatment in Lake Champlain. Several species of frogs and salamanders were killed, but mudpuppies, *Necturus maculosus*, was the only species killed that was not found in either pre- or post-treatment sampling, presumably due to our inability to develop appropriate sampling protocols. Young mudpuppies can be separated into distinct size classes that correspond to age classes from year 0 to 6 plus adults. Following the first treatment, dead mudpuppies of all size classes were recovered. Lampricide treatment re-occurred at approximately 4-year intervals. During subsequent treatments, dead mudpuppies were recovered in each of the tributaries where mudpuppies were recovered following the first treatment. However, size class distribution did change, primarily with fewer individuals in the younger age classes being recovered. Possible explanations are that not all the mudpuppies were killed or that mudpuppies re-invade from the lake. In either case there seems to be an affect on reproductive success following treatment.

Integrating Odonatology with Aquatic and Wetland Conservation Science

Bried, Jason T. (Albany Pine Bush Preserve and Eastern New York Chapter, The Nature Conservancy, Albany, NY, 12205)*

Beyond their pragmatic, heuristic, and empathetic value, adult dragonflies and damselflies (Odonata) also have ecological significance for aquatic and wetland conservation science. I will discuss how odonatology fits with (1) bio-delineation of buffer zones, (2) biodiversity indication, (3) habitat indication, and (4) rapid functional assessment, and will support the discussion with data from recent graduate research in Mississippi. The data from Mississippi add to growing evidence that adult Odonata have much to offer with respect to conservation of aquatic and wetland resources, in the northeastern United States and elsewhere.

Monitoring Habitat Quality for Karner Blue Butterfly Recovery

Bried[,1], Jason T., Timothy H. **Tear**[2], Rebecca R. **Shirer**[3], Christopher L. **Zimmerman**[3], and Neil A. **Gifford**[4] ([1]Albany Pine Bush Preserve and Eastern New York Chapter, The Nature Conservancy, Albany, NY 12205; [2]Global Conservation Assessment Team, The Nature Conservancy, Albany, NY 12205; [3]Eastern New York Chapter, The Nature Conservancy, Troy, NY 12180; [4]Albany Pine Bush Preserve, Albany, NY 12205)*

In response to precariously low population numbers of the federally endangered Karner Blue butterfly (KBB) (*Lycaeides melissa samuelis* Nabokov) in east-central New York State, the Eastern New York Chapter of The Nature Conservancy, in conjunction with partners, has developed a plan to evaluate quality of KBB habitat and measure progress of restoration activity. During summer of 2005 we monitored habitat quality of 25 KBB sites (patches) in the Glacial Lake Albany federal recovery unit. We used several sampling designs for field work and made extensive use of a geographic information database. The habitat quality data included host plant abundance, richness and frequency of nectar species, cover and height of vegetation guilds (e.g., native grasses, woody overstory), and patch size and connectivity. From this information, a series of numerical habitat quality indicators was developed. The ecologically desirable and less-than-desirable levels of these indicators were drawn from KBB federal and state recovery plans along with expert knowledge and local experience. Multi-metric analysis suggests adequate size and connectivity for most study patches, but nutriment and structure conditions may need further restoration. Overall, habitat quality scored below ecologically desirable status, but continued restoration is likely to facilitate the butterfly's recovery and long-term viability. We plan to validate or revise the current habitat indicators based on relational analyses to KBB abundance. We also hope to complement habitat monitoring by forecasting extinction risks with incidence function models and risk-based viable population monitoring.

Drift of Larval Fish in the Poultney River

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Drift of larval fishes in large and small rivers has been noted and studied since the middle of the 20th century, though not to the same extent as drift of invertebrates. Invertebrate larvae are thought to drift for many different reasons, biotic (dispersal, avoidance of predation and competition), abiotic (in response to spates, droughts, temperature change, or pollution) and accidental (simple dislodgement). Studies of invertebrates have most often been described the drift pattern for taxa (diel, seasonal, life stage dependency), but have not shed much light on causes. It is the more recent experimental studies that have at last begun to link drift to its causes in invertebrates. Studies of fish larval drift have followed those of invertebrates, establishing patterns but generally not causes. While it is important to understand the patterns, it is then necessary to go to the next level to try to rule out competing hypotheses. In this paper I present data on the pattern of drift (time of day, developmental stage, density, and species) for the fish community of the mid-Poultney River, and a test of one hypothesis for the most commonly drifting species.

Survival of Lab-born and Field-born Timber Rattlesnakes (*Crotalus horridus*): Implications for Conservation

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Timber rattlesnake conservation strategies may include measures such as reintroduction or translocation of snakes to extirpated dens. At a long-term field site in the southeastern Adirondacks, lab-born neonates (n=181) were produced by females captured in the field during late gestation and returned to the lab for birthing. Field-born neonates (n=407) were captured in the wild from litters encountered during routine field sampling. Lab-born neonates were produced only during a five-year interval

(1982–1986) early in the study, whereas field-born snakes were captured and marked opportunistically over the entire duration of the study (1978–2002). The protocol for retaining and processing all neonates of both groups was identical (housed in captivity, measured and marked after shedding). Lab-born neonates were significantly smaller in body mass (21.5 g) than were field-caught neonates (23.2 g). At an average age of about 15 days all post-shed young-of-year snakes of both groups were released on the maternal den in autumn of the birth year. Using capture-recapture modeling of individual capture histories of the 588 marked newborns over the 25-year study, the estimated first-year survival rate in the lab-born neonates was around 35% while that of the field-born neonates was around 65%. Although newborns are thought capable of establishing a newly viable population, management programs should be aware that a higher survival rate in field-born neonates suggests that they, rather than their lab-born counterparts, may more successfully constitute the reintroduction stock.

Dragonflies and Damselflies of Rhode Island: Species Diversity, Land Use, and Conservation

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During the seven year field portion of the Rhode Island Odonata Atlas, more than 1100 sites were sampled in the state's 39 townships and five counties. Over 12,000 voucher specimens were collected, 70% of these by volunteers. Additionally, volunteers contributed more than 8,000 hours to the Atlas, participating in all aspects of the project. 21 species were added to the state's list, which now totals 137 species. The volunteer work force is responsible for the discovery of 14 of the 21 new species and 67 of 109 (61.5%) new sites for state-listed species. Analysis of the relationship between odonate species diversity at township and sub-watershed levels and various land use parameters revealed a strong positive correlation between species diversity and percent forest cover and a negative correlation between species diversity and percent development/roads. 25 managed areas ranging in size from just under 100 acres to 14,000 acres were surveyed during the project. Species diversity was positively correlated with managed area size (in acres). Species diversity increased at a greater rate in managed areas of between 100 and 2,000 acres than in those larger than 2,000 acres, and began to level off at approximately 3,200 acres. These and other results of the Rhode Island Odonata Atlas have been utilized by conservation agencies in a variety of ways, including prioritizing parcels for acquisition, planning for land management, and making regulatory decisions.

Significance of Littoral and Shoreline Habitat Integrity to Lacustrine Damselfly Conservation

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Shoreline development can have significant impacts on native lacustrine biota including a variety of aquatic macroinvertebrate groups. In an effort to better understand the habitat associations and sensitivities of lacustrine damselflies (Odonata: Zygoptera), we sampled adults in littoral macrophyte habitat during two flight periods at 35 randomly selected pond and lake sites in southern Maine during 2000 and 2001. Habitat data were collected during the same period to help characterize water body, shoreline disturbance, and aquatic vegetation at each study site. Nonmetric multidimensional scaling was used for ordination of damselfly assemblages, and resulting coordinates from the most stable three-axis solution were related to site variables using forward stepwise multiple regression. Our results suggest that the diversity and composition of damselfly assemblages were related to the abundance and richness of littoral zone macrophytes, extent of riparian habitat conversion, benthic substrate granularity, and habitat productivity; all variables subject to anthropogenic degradation on excessively developed waterbodies. Additionally, we developed a Habitat Tolerance Index useful for distinguishing between relative habitat specialists and generalists from among a diverse community of 19 lacustrine species. Finally, species-specific damselfly associations with multiple genera of floating and emergent macrophytes were assessed using both nonparametric correlation and multiplicative regression yielding significant relationships for 17 species, including two damselflies of regional conservation concern, *Enallagma laterale* and *E. pictum*. We conclude that the protection of littoral habitat integrity, with special emphasis on emergent and floating macrophytes, is critical to the conservation of a diverse lacustrine damselfly fauna.

Trace Element Analysis of Northeastern Lithic Artifacts: Chert and Flint

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Silica-rich rocks and their fragments are often the only remains of early cultures in the northeastern United States and eastern Canada. Archaeologists trace cultural boundaries and trade routes by characterizing the style of manufacture and source material of scrappers, awls, hammer stones, and, especially, projectile points. Synchrotron x-ray fluorescence study at Cornell's High Energy Synchrotron Source has established a library of trace element signatures for silica-rich rocks from known quarries in Europe and New York State. We're expanding our library of signatures to include quarry sites throughout the northeast and invite submission of archaeologically-interesting artifacts and quarry stone for characterization. Preliminary sourcing studies distinguish thermally-altered New York cherts from similarly-colored Pennsylvania jaspers. Recent work at Cornell's High Energy Synchrotron Source has demonstrated variation of heavy metal concentrations across the annual growth rings in fish otoliths, mastodon tusks, and tree rings and the heterogeneity of metal concentrations in soil profiles.

Relationship of Bryophyte Communities to Decay Class of *Thuja occidentalis* Logs

***Clark**[*], Theresa A. (Environmental Studies Program, Cazenovia College, Cazenovia, NY 13035)*

Coarse woody debris (CWD) is an especially important substrate for bryophytes. Differences in microenvironmental variables among decay classes of CWD may influence bryophyte community structure. Several studies have shown certain bryophytes to display CWD decay class specificity. However, relationships between decay class and bryophyte communities are unclear for many tree species. I quantified relationships between decay class and bryophyte diversity and species richness on *Thuja occidentalis* logs within an old-growth coniferous forested wetland in Madison County, New York. I predicted that bryophyte richness and diversity would increase as CWD progresses from recently dead to intermediate decay stages and would then decrease from intermediate to advanced stages of decay. I sampled bryophyte communities on 10 logs in each of three decay classes (recently dead, intermediate decay, advanced decay). To estimate species richness and diversity on each log, I recorded the percent cover of each bryophyte species along two, 1-m transects. Logs with intermediate or advanced decay had significantly higher bryophyte diversity, species richness, and evenness than recently dead logs, although no significant differences were found between logs in intermediate and advanced decay classes. I suggest that a potential cause for the similarity in intermediate and advanced decay classes is the high abundance of forest floor bryophytes densely bordering all logs sampled; these bryophytes may have maintained more consistent levels of moisture in the decaying logs thereby sustaining favorable conditions for the bryophyte community into later stages of decay.

Turtles in Sprawlville: Landscape Models for Strategic Conservation in Massachusetts

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Turtle populations are especially vulnerable in areas with high road densities and traffic rates. Due to their life history strategy, small increases in mortality of adult turtles can lead to serious population declines. Adult turtles of several species typically move long distances overland between wetlands, often crossing roads in the process, where they may be killed. Suburban sprawl in much of Massachusetts is thus likely driving a collapse of turtle populations. Traditional reactive conservation seeks to protect vulnerable species by restricting or modifying development projects near known species locations. We argue that this approach is insufficient, and must be combined with strategic conservation efforts, which seek to proactively protect large blocks of habitat where populations are potentially viable. To help identify conservation targets, we are building spatially-explicit models for three state-listed species: spotted turtles (*Clemmys guttata*), wood turtles (*Glyptemys insculpta*), and Blanding's turtles (*Emydoidea blandingii*) across Massachusetts. These models assess both potential habitat availability and likely sources of mortality. Models combine GIS data (e.g., wetlands, land use, road traffic) with habitat selection and movement patterns based on empirical data and expert opinion. Results of these models will be used by the Massachusetts Natural Heritage and Endangered Species Program to help drive surveys and inform proactive land protection.

Monitoring Amphibian Mortality during Migration: Tompkins County, NY

***Confer**, John, Anthony **Parisi**[*], Kyle **Block**[*], and Mark **Hager**[*] (Ithaca College, Environmental Studies, Ithaca, NY 14850)*

It is well documented that amphibian populations are declining in the Ithaca region. In response to this query Dr. John Confer and a group of Ithaca College students set out to determine the impact road mortality was having on local amphibian populations. Thomas and Ellis Hollow Roads., in the nearby town of Caroline, host two large amphibian migrations each spring. This past spring we conducted a first year's survey to collect data and determine which species were crossing the roadway and hot spots where amphibians cross in high numbers with significantly lower migrations at the adjoining ends. Aside from our data collection and scientific analysis we also worked to raise community awareness and gain local support for our efforts. This spring we will again be monitoring the amphibian migrations and compiling data to assess possible culvert applications at these two sites. In conjunction with our community involvement in Caroline we are attempting to determine a source for funding for the possible road construction and culvert materials. This spring's data will serve to reinforce our beliefs as to the location of the migrations, and so that we may more accurately inform the town of Caroline.

Dogs, People and the Karner Blue Butterfly at Saratoga Spa State Park

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The Karner blue butterfly (*Lycaeides melissa samuelis*) has suffered a 90% population decline over a 30 year period. It was listed as a federally endangered species in 1992. As with many species, habitat destruction and fragmentation are the main factors contributing to the declining population of the Karner blue butterfly. Today, there are a total of 13 Federal Recovery Units within the United States. One is located within NYS: the Glacial Lake Albany Recovery Unit. As a part of this recovery unit, Saratoga Spa State Park in Saratoga Springs, NY has dedicated the 75 acres of parkland with suitable habitat to the preservation and conservation of the Karner blue butterfly. This widely used parcel not only plays host to the endangered Karner, but also by walkers with their canine companions and bikers using the wooded trails. In partnership with a number of state and federal agencies, the public and local organizations, Saratoga Spa State Park has been striving to preserve and protect an endangered butterfly while maintaining a compatible multiple-use area within its habitat. By implementing simple guidelines, educating and involving the public and fostering relationships with partner organizations, the park continues to play an important role in protecting New York State's Karner blue butterfly population.

Population Dynamics and Conservation of Black Terns (*Chlidonias niger*) in New York State, 1989–2004

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Black Terns are listed as an endangered species in New York and have been declining range-wide since the 1960's. In 1989, a statewide monitoring program began and in the years 1990, 1991, 1994, 1998, 2001, and 2004, 110 different sites were surveyed for nesting pairs. We analyzed these monitoring data using simple linear regression, power analyses, and spatial autocorrelation to elucidate population dynamics and highlight potential areas for conservation and management. Black Terns statewide have experienced a 38% decline since the early 1990's, at a significant ($R^2 = 0.73$, $p = 0.014$) annual rate of -3.4% and would become extirpated from the State by 2027 if this trend were to continue unabated. A power analysis showed that the monitoring program had sufficient power ($\alpha = 0.05$; $\beta = .80$) to detect this level of decline. Since Black Terns are known to move between nesting marshes we performed pairwise cross correlations on abundance to see if we could detect source/sink (i.e., metapopulation) dynamics. The overall correlation of all pairwise comparisons was nearly 0 (mean $R = 0.077$) inferring a very high degree movement among breeding sites. In particular, 6 marshes appear to be acting as (meta)population sources and severe declines at two of them could account for much of the decline observed in the state over the past 15 years. Marsh sites determined to be functioning as source populations deserve special conservation and management status in order to protect the statewide population of this important species.

New York's Second Breeding Bird Atlas: Twenty Years of Change

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New York State is the first in North America to complete its second traditional, full-coverage Breeding Bird Atlas project. Six years of field work (2000–05) have resulted in a database with more than 380,000 records. Updated distribution maps for more than 250 species can be compared to those generated from the state's first Atlas project (1980–85). Statewide or regional expansions are apparent in the distribution of about 35 species, including Cooper's Hawk and Red-bellied Woodpecker while contractions are seen in 22 species, including Whip-poor-will and Brown Thrasher. Several new species have been added to the breeding avifauna of the state; Black Vulture and Merlin were absent from the first atlas but are now well-established. The new Atlas publication, which will be available in 2008, will include a current distribution map and a map indicating change for each species that breeds in the state and discussion of the changes on a broad and localized scale. New, original artwork will illustrate the publication.

Double Crested Cormorant Colonies May Depress Litter Biodiversity: A Pilot Study

***Danoff-Burg**[*], James A. (Department of Ecology, Evolution, and Environmental Biology, Columbia University, New York, NY 10027)*

Double Crested Cormorants (DCCO) are a species that is native to the eastern US. In recent decades, after a period of decline, their populations have been dramatically expanding throughout historical regions of their range and into areas in which they have not historically existed. On islands that they have rookeries, their reproduction is so prodigious that they quickly become the dominant reproductive bird species and crowd out other species that were previously using those areas for reproduction. They have very acidic guano and produce this in extraordinary quantities that coat the lower canopy vegetation, ground dwelling plants, and leaf litter. The impact of the DCCO guano on the undercanopy vegetation and the animals dwelling in it has not yet been determined, nor even explored. Initial results from a pilot study of islands in the New York Harbor indicate that the lowest number of species, smallest number of individuals, and lowest overall biodiversity all were found in the center of the DCCO colony—all of these measurements increased with increasing distance from the center of the DCCO colony. It is likely that the intense DCCO breeding colony size on these islands is having a definite detrimental impact upon litter biodiversity, likely mediated through the loss of understory plant biodiversity where the DCC breed most prodigiously.

Monitoring the Migration of Songbirds at the Braddock Bay Bird Observatory

***Deutschlander**[*], Mark E. (Department of Biology, Hobart and William Smith Colleges, Geneva, NY 14456 and the Braddock Bay Bird Observatory, Rochester, NY 14612)*

The Braddock Bay Bird Observatory (www.bbbo.org) is a volunteer-based, non-profit organization dedication to research, education, and conservation of migratory birds. Our primary facility, the Kaiser-Manitou Beach Banding Station, is located on the south shore of Lake Ontario in the Braddock Bay wetlands complex near Rochester, NY. Braddock Bay is an Audubon Society Important Bird Area, as it is a focal point of songbird and raptor activity during migration. In this presentation, an overview of the Observatory's activities will be provided, including both research and education opportunities for interested scientists and students. The primary research of the Observatory is intensive daily monitoring of songbird migration during spring and fall. For eight-weeks each season, migrants are mist-netted, marked with Federal bands, and data such as sex, age, mass, and fat levels are collected. Typically 3000-5000 birds are banded each season. Seasonal and yearly variations in migration are monitored, and data on each bird are submitted to the U.S.G.S. Bird Banding Lab. Observatory scientists conduct research projects on habitat use and stopover biology, differential migration patterns, molt strategies of migrants, orientation and navigation, and migration physiology. Observatory staff members often collect samples (such as feathers) at the request of national and international colleagues. Education in bird banding techniques is available through a training course offered by Observatory staff, and opportunities to be certified as a bander or bander trainer by the North American Banding Council are available each fall. Additional local and national roles of the Observatory will be discussed.

Late Pleistocene–Holocene Geologic History of the Albany, NY Area

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The Late Pleistocene and Holocene deposits of the Albany area have been mapped in detail. Geomorphic analysis and surface and subsurface stratigraphy reveals a complex history, including two glacial advances, several recessional moraines, multiple proglacial lake stages, Great Lakes and Champlain glacial meltwater flow, and three or four catastrophic floods. Approximately 12,900 radiocarbon years ago, a large proglacial lake formed in front of the retreating ice. The lake fell through several distinct levels until 11,100 radiocarbon years ago, including the Ice-Marginal Albany, Stable Albany, Quaker Springs, Coveville, and Fort Ann stages. A brief, higher lake level occurred between the Ice Marginal and Stable stages. Catastrophic floods from the Mohawk and Champlain valleys gouged out the present day Hudson River channel during the Quaker Springs, Coveville, and Fort Ann stages. West-northwest and southwest winds deposited a broad dune field (the Pine Bush) between Schenectady and Albany. Dune building was most intense during the waning lake stages, although dunes have been reactivated during prolonged droughts and by human activities. The last catastrophic flood out of the Mohawk Valley initiated Cohoes Falls. A waterfall on the Hudson River at Coeymans is buried under Holocene deposits; tidewater probably drowned it 7,000 radiocarbon years ago. The Holocene tributary system started developing as lake levels fell. Confluences of modern streams with the Hudson and associated alluvial fans are buried under floodplain and estuarine deposits.

Rare Northern Butterflies of the Northeast

Dirig, Robert (Bailey Hortorium Herbarium, Department of Plant Biology, Cornell University, Ithaca, NY 14853)*

This photo gallery highlights fourteen butterflies of northern affinity that attain their southern limits in the Adirondacks and high peaks of New England. Mustard Whites appear in May in mature woodlands around toothworts, their larval host. Highly cryptic Bog Elfins and Jutta Arctics fly in May and early June in bogs, where their larvae eat black spruce and cottongrass, respectively. In mid-June, Bog Fritillaries ornament northern peatlands in association with small cranberry. The endemic White Mountains Arctic and Katahdin Arctic skim over tundra vegetation on Mounts Washington and Katahdin, near Bigelow's sedge, their foodplant, in late June and July; while the White Mountains Fritillary appears at slightly lower elevations on Mount Washington in early August. Gorgeous Crowberry Blues (which share the Karner Blue's genus) glitter in coastal Maine bogs in association with black crowberry in July. The iridescent purple wings of Clayton's Copper grace fens with their shrubby cinquefoil host in July and August. Olive-green Laurentian Skippers live along watercourses in northern New England near the grasses they eat. Resplendent Green Commas and Hoary Commas emerge in August, visiting puddles along dirt roads through wet boreal forests near their birch and gooseberry foodplants. Atlantis Fritillaries and Pink-edged Sulphurs are usually common in July and August in similar habitats, where violets and blueberries grow. Most northern butterflies have one annual brood, with adults flying during the longest and warmest days of the year. Finding these rarely seen species can be very challenging, but is always satisfying.

Alleviation of Restoration Thresholds on the Solvay Waste Beds, NY

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The Solvay waste beds near Onondaga Lake are approximately 20 meters in depth by 600 hectares. They are primarily calcium carbonate industrial refuse deposited from 1881 to 1986. These wastes had a pH of 11 to 12 and conductivity of approximately 40 dS m^{-1} when deposited. Within 20 years of deposition the waste weathers sufficiently to allow vegetation, predominately non-native species, to colonize much of the site. Our objectives were to vegetate barren seepage areas, increase forested area and its plant diversity, and increase wetland species diversity. In 2005 we initiated two experiments to determine what factors are limiting the survival and growth of planted and naturally occurring species on the site: (1) we observed vegetation dynamics following tilling and fencing; and, (2) on an upland to wetland gradient, we planted and observed the performance of approximately 7000 woody and herbaceous plants of 59 species. Survivorship after the first summer was greater than 70% for 21 of the 38 upland species planted. *Rhus glabra, Prunus pensylvanica, Populus deltoides, Salix nigra,* and *Juniperus virginiana* showed the greatest capacity for height growth. Wetland plants adapted to saline environments performed better than those adapted to alkaline environments, with *Spartina alterniflora* and *S. patens* performing best. Herbivory and competition with grasses and non-native legumes limited the establishment of woody species, however seed availability may have also been limiting. Soil conductivity was positively correlated with woody species mortality. Future work includes observing the above experiments and addressing species selection and site preparation in seepage areas.

Aquatic Plants as Indicators of Ecosystem Recovery from Acidification

***Eichler**, L.W. and C.W. **Boylen** (Darrin Fresh Water Institute, Rensselaer Polytechnic Institute, Bolton Landing, NY 12814)*

While the focus on aquatic plants has frequently been as nuisance "weeds," aquatic plant communities play a major role in the structure of lake habitats and ecosystems. As part of the Adirondack Effects Assessment Program, aquatic plant communities in a diversity of lake types are being evaluated. In addition to their position as primary producers where they serve as the base of numerous aquatic food chains, aquatic plants provide habitat for algae and zooplankton, invertebrates and numerous fish species. Aquatic plants also provide a food source for numerous aquatic and semi-aquatic organisms such as waterfowl and mammals. Aquatic plant species range from highly tolerant species, which are present over a wide range of pH, to species which are distinctly circumneutral or acidophilic. Overall, lakes having decreased pH will have a characteristic littoral zone where aquatic plant species are represented largely by nymphaeids, isoetids, *Sphagnum* spp., and *Utricularia* spp. Lakes with less acid pH levels typically support larger pondweeds (*Potamogeton* spp.) with greater habitat complexity and species richness. Aquatic plant community structure in Adirondack lakes has important implications for recovery assessment, given their importance in structuring littoral zones and their associated communities.

Patch Size and Habitat Effects on Small Mammals around New York City

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During 2004 and 2005 we collected data on small mammal communities in and around New York City to investigate the effects of patch size, habitat type, and urbanization. We completed 24 surveys from 12 different sites in urban, suburban, and rural landscapes comprising salt marsh, grassland, shrubland, and forest habitats. Trapping surveys were conducted over the course of three nights using 49 Sherman live-traps laid over one hectare. We found clear differences between small mammal communities in different habitat types, both in the species present and in the Shannon-Weiner diversity index scores. Overall small mammal density was not significantly different between any habitat types. In forest sites, deer density negatively correlated with small mammal density, as did patch size. Urbanization, patch size, and deer density did not significantly influence small mammal diversity in forests. Not enough data were available to investigate these effects in other habitats. Our results indicate that small, urban green spaces can support small mammal communities mostly representative of the region as a whole, though some rare species usually found at low densities may be missing. Our trapping protocol may have under-represented insectivorous species such as shrews, and our results may not be pertinent for these types of species (particularly those at low density). In the coming field season we will incorporate pitfall traps to address this problem while also increasing the number of survey sites to better understand patterns in habitats other than forest.

Nearly Thirty Years of Wading Bird Nesting in the New York Harbor

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New York City is home to colonies of wading birds and seabirds, nesting on the islands of the New York/New Jersey Harbor. Species abundance and relative composition have changed over the past 20 years, with several species undergoing dramatic declines. Annual nesting surveys have been done in the Harbor for over two decades (1977–2005). Nine wading bird species have bred there: Black-crowned Night-Heron (BCNH), Great Egret (GREG), Snowy Egret (SNEG), Glossy Ibis (GLIB), Cattle Egret (CAEG), Yellow-crowned Night-Heron (YCNH), Little Blue Heron (LBHE), Green Heron (GRHE), and Tricolored Heron (TRHE). Total wading bird population ranged from 971 pairs on 3 islands (1985) to 2313 pairs on 9 islands (1993). BCNH was the most abundant and wide-spread species, occurring on eight islands (mean=981 pairs/year; SD=88.5) during the last 6 years and with a high count of 1343 nests in 1993 (60% of the population). CAEG exhibited the greatest decline, numbering 266 pairs in 1985 on two islands and decreasing to fewer than 5 pairs from 2000 on. Three islands in the Arthur Kill and Kill Van Kull supported the highest diversity of breeding species (8 species) but have virtually been abandoned since 2001. Double-crested Cormorants (DCCOs) nested on two islands in 1987 (957 pairs), increasing and expanding their nesting to a maximum of 1806 pairs on three islands (1995). Since 2002 the average number of nesting cormorants has been 1021 pairs, nesting on six islands. Changes in abundance and distribution of inner harbor populations may be related to foraging habitat contaminants.

Hydroacoustic Assessment of Brooktrout Lake

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Brooktrout Lake was once a thriving fishery, until becoming fishless due to acidification. In recent years, biological and chemical trends suggest the lake is undergoing natural recovery, enough to justify restocking in November 2005. Congruent with this stocking effort a hydroacoustic assessment was initiated to test the applicability of sonar as a non-invasive fisheries tool for small remote lakes. Initial surveys were designed to provide an unbiased estimate of fish biomass and population numbers. In addition, data was used for creating accurate bathymetric maps, and will be analyzed for substrate classification, identification of critical fish habitat, evaluation of zooplankton movements and densities. Assessment was performed using a BioSonics DT-X hydroacoustic system (430 kHz, 10 degree beam angle). Data analysis was performed using BioSonics Visual analyzer and Eco SAV programs, with mapping performed using MapInfo, Excel and Surfer software. A target strength library for brook trout, juvenile and adult, was created through direct tank experiments. Sampling design consisted of matched day and night transect sets, covering roughly 9.6% of the lakes volume. Bathymetric data revealed significant differences in aquatic habitat as compared to those portrayed by historic maps. The pre-stocking hydroacoustic data analysis yielded no target strength profile indicative of fish. Post stocking data analysis yielded positive identification of adult brook trout and applicable population estimates. Current analysis is unable to detect young-of-year (YOY) due to zooplankton interference, and potential discrepancies of preferred habitat and transect locations.

Fern Colonization of Post-Agricultural Forests in Central New York

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As in much of the northeastern United States, the vegetation of central New York has been shaped by a history of forest clearing for agriculture, farm abandonment and forest regrowth. Forests that developed on former agricultural fields consistently show reduced diversity and altered species composition compared to forests that were never cleared. In particular, herbaceous plants vary widely in their ability to colonize post-agricultural forests. I investigated the ecological processes creating this pattern by focusing on several fern species common in mesic, upland forests: *Polystichum acrostichoides*, *Dryopteris carthusiana* and *Dryopteris intermedia*. Despite having similar capacities for long-distance dispersal, these species show contrasting distributions across forests of different history. To specify which life history stages limit the colonization of post-agricultural forests, I compared the demography of the three species in post-agricultural and uncleared forests with a combination of descriptive and experimental approaches. I quantified the availability of spores deposited on the ground and stored in the soil; I conducted a three-year field experiment to examine germination, establishment and survival in different microsites; and I surveyed the distribution of juvenile plants in relation to available microsites. Together the results suggest that microsite availability overrides spore dispersal in determining the distributions of these species, and that small-scale habitat heterogeneity may facilitate the recovery and maintenance of diversity in post-agricultural forests.

Spatio-temporal Habitat Partitioning among Three Sympatric Predators in a One-prey System

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Investigations of multiple predators sharing one prey are rare in natural, terrestrial systems. This study offers an explanation as to how sympatric black bears *(Ursus americanus)*, grizzly bears *(Ursus arctos)* and gray wolves *(Canis lupus)* coexist on a seasonally limiting prey item, specifically moose calves *(Alces alces)*. Spatial and temporal separation within a shared niche dimension has classically been offered as an explanation for sympatric species coexistence. Habitat partitioning, resulting from differential hunting behaviors among members of the predator guild, is often used as a means of capitalizing on a common resource. During the summer 2002, we radio-collared 81 moose calves during parturition and monitored their survival throughout the season. Additionally, calf mortality-sites were investigated to determine causes of death and to classify understory vegetation composition. As an added predator dimension, twenty black bears were GPS-collared and their movements were monitored 8 times/daily for a full year. Preliminary analysis of these data suggests a complex sex and age-specific pattern of black bear habitat usage. Consequently, findings from this study indicate the need to consider each member of the predator guild individually, complete with its own suite of behavioral, physiological and foraging strategies.

Twenty Years of Research in the Aquatic Plant Communities of Honeoye Lake

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Shallowest of the Finger Lakes, Honeoye supports a diverse aquatic plant community. Sampling in 1984 established twenty transects extending from the shoreline into deeper water. Five stations were located along each transect. Through the use of SCUBA, fall standing crop biomass (g/m^2) was hand pulled within a weighted quadrat frame. Samples were sorted by species and air dried. Plant relationships with environmental features, including water depth and substrate chemistry, were tested with regression analyses. Disturbances during the past two decades (e.g., perimeter sewering, mechanical harvesting, zebra mussel invasion, milfoil herbivores) are suspected of causing changes in community patterns and processes. Subsequent fall standing crop biomass studies in 1994 and 2004 provide insight on shifts in species dominance and distribution as well as changes in the areal extent of macrophyte beds in the lake. Community resilience to these disturbances has been remarkable and Honeoye Lake today remains species rich and productive.

Breeding Populations of the Comet Darner (*Anax longipes*) in Upstate New York

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Based on historical and recent records for New York, the Comet Darner is an uncommon to rare species in upstate New York, with less than 10 records away from Long Island since the early 1970s. It has been noted as a species that wanders episodically away from the coast and few confirmed, stable, breeding populations away from the coast are documented. Capture/release and sightings of male Comet Darner adults at a private pond in the Finger Lakes region of New York in 2004 and 2005 were bolstered by the discovery and identification of ten exuviae in July and August of 2005. The breeding pond was dug in 1999 as a pond for swimming and was stocked with fathead minnows for mosquito control. The pond is 18 feet deep with steep sloped sides, and the periphery is ringed with sedges and cattail. The bottom is well covered with *Chara*. A stable breeding population is known from a similar man-made pond in Albany County, New York that has been occupied by Comet Darners since 1993. Dates of collection of exuviae are primarily from late June through early August. Adult activity appeared to be primarily in the early morning and late afternoon.

Substrate and Topographic Controls on Catskill Forest Composition: Implications for Disturbance Recovery

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The northern hardwood forests of the Catskill Region, NY are currently experiencing a wide range of disturbances including wind storms, acidic deposition, and forest pests and pathogens. Predicting the community level response to these disturbances is of importance to understanding both potential changes in biogeochemical processes and the future susceptibility of forests to these disturbances. In this study we examine the influence of topography and substrate quality on the distribution of five major tree species of the Catskill Mountains, and discuss the role these factors may have in determining the community-level response to beech bark disease, a non-native forest pest/pathogen complex. Data were collected from 186 stands within the Catskill Forest Preserve across gradients of aspect, elevation, and calcium availability. Our results suggest that the dominant species of the region respond individualistically to gradients in elevation and aspect, consistent with patterns previously observed in these and other northern hardwood forests. However, our data also show that these topographic patterns are modified by calcium availability. For almost all topographic positions, sugar maple (*Acer saccharum* Marsh.) abundance was found to be greater in high calcium watersheds, while American beech (*Fagus grandifolia* Ehrh.), yellow birch (*Betula alleghaniensis* Britt.), eastern hemlock (*Tsuga Canadensis* [L.] Carr.), and red maple (*Acer rubrum* [L.]) abundance showed the reverse pattern. Taken together, these landscape-scale controls on species distribution may help us to predict competitive outcomes resulting from disturbance types specific to particular portions of the landscape.

Betula populifolia Phenology and *Fenusa pusilla* Usage and Success

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The birch leaf miner sawfly, *Fenusa pusilla* Lepetelier, lays eggs within young leaves of many birch (*Betula*) species. The suitability of birch leaves varies not only by species but also within a species; leaves of different ages and locations within species represent a heterogeneous resource to leaf-mining insects, whose oviposition decisions constrain the success of their offspring. Over a three year period in the Adirondacks, I studied oviposition choice and larval success of *F. pusilla* in relation to the phenology of young gray birch, *B. populifolia* Marsh. In each year, I followed the fates of roughly 50 randomly selected shoots throughout the growing season. At the same time, I observed ovipositing females and larval success on individual leaves of known age and shoot type. In all years females chose terminal long shoot leaves more often, and laid more eggs per leaf, than they did leaves on lateral long shoots or short shoots. In contrast, larval success varied among years. Only once was larval success greatest in terminal long shoots; in other years, larvae did equally well on lateral long shoots. Differences in natural enemy attack, rates of herbivory by other insects, and extrinsic factors affecting *B. populifolia* phenology (drought, cool weather, and deer browse) influence larval success. Thus, female *F. pusilla* may be constrained to using leaves which provide a higher probability (rather than certitude) of larval success over a few generations or years.

Summer Habitat and Microhabitat Choice by Wood Turtles (*Clemmys insculpta*)

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Over 20 individual wood turtles at 6 field sites in northeast Connecticut were tracked using radio telemetry over a three-year period. Data was collected on general habitat selection for the mid-day period. Microhabitat choice was also collected and compared to random points within the general habitat type. The data indicate a high variability in the habitat types used *by Clemmys insculpta* for summer foraging and resting. There is also evidence of differences between microhabitat choice between juveniles and adults. Implications for management are discussed. Practical aspects of conducting fieldwork with high school students was also evaluated. Preliminary data on a *Clemmys insculpta* population inhabiting a heavily tide-influenced stream in the Hudson Valley is also included.

Audubon Center Participation in New York Dragonfly and Damselfly Survey

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Seven nature centers affiliated with the National Audubon Society are participating in the New York Damselfly and Dragonfly Survey. In the first field season, Audubon staff engaged over 250 people in odonate collection, from elementary students to adults. Involving the public in insect survey data collection includes dealing with attitudes towards insects and towards taking voucher specimens. A method of taking live specimen photographs of high enough quality to ensure identification was developed. Odonate collection is also proving effective as a means of connecting diverse audiences, including urban high school students, to insect biodiversity studies. Educational materials for public display and for elementary students have also been developed as part of the project.

Acid Rain, Mercury Deposition, and Contamination of Common Bird Species in New York

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Birds breeding in many areas of New York are exposed to acid rain, as well as deposition or uptake of atmospheric mercury in the environment. Although the pathways for biomagnification and bioaccumulation of methylmercury are relatively well-studied in aquatic systems, comparatively little research addresses the contamination of vertebrate species in terrestrial systems like forests. Further, a growing body of evidence suggests that the combined effects of multiple stressors such as acid rain and mercury deposition may be synergistic, i.e., multiplicative, not additive, with unexpected and unexpectedly large effects. We report the results of research carried out at forty sites in four regions of New York to determine the extent of mercury contamination of four species of common, forest-breeding birds. We link acid deposition and soil pH to the abundance and biomass of calcium-rich invertebrate prey in leaf litter that may be crucial sources of calcium to breeding birds. Many species of songbirds, particularly insectivorous or granivorous birds, derive insufficient calcium from their normal diet to successfully lay eggs and raise a clutch to fledging. Many species depend on calcium-rich invertebrates for successful reproduction, and these invertebrates may be smaller and less abundant in areas with highly acidic rain or in the presence of contamination by trace metals such as mercury. We show that the mercury content of forest soils and of calcium-rich prey varies across region. We present the results of our analysis of blood mercury levels by species and regions, and discuss the implications for conservation.

Gravel Boxes Provide New Nesting Habitat and Increase Productivity in Common Terns

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Common Terns are a state-listed threatened species that nest on artificial sites on eastern Lake Erie and the Niagara River, New York. Nearly 1600 pairs of Common Terns nested in Buffalo Harbor in 2005, making this the largest tern colony in the Great Lakes. Terns nest on the cement surfaced breakwalls and productivity is generally very low due to chicks falling from the breakwalls and egg failure due to the concrete surface. Over the last 18 years (1987-2004) productivity ranged from 0.14 to 0.59 (mean 0.33) chicks fledged per nest, well below the level necessary for a self-sustaining population. In 2004 and 2005, we experimented with gravel nesting boxes. Four boxes were built in 2004 and 38 boxes were built in 2005. Each box was constructed with 2X6 lumber and plastic perimeter fence, and filled with gravel hand-carried in five gallon pails. Productivity in these nesting boxes ranged from 1.3 to 2.7 (mean 2.0) chicks fledged per nest, much higher than any productivity recorded in the previous 18 years. In addition, nesting synchrony was greater. The combination of higher hatching rates on the gravel nesting substrate and higher chick survivorship inside the fenced boxes increased average productivity values by 600%. Gravel nesting boxes clearly demonstrate the productivity gains that can be made by enhancing tern nesting habitat on the Buffalo Harbor breakwalls. However, these enhancements must be completed annually and are labor intensive. The future productivity of terns breeding at these sites will be dependent on permanent nesting habitat enhancements.

The Common Tern Habitat Improvement Project: Helping Restore a Threatened Species

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The Common Tern Habitat Improvement Project (HIP) is an effort by the New York Power Authority to increase the number of breeding Common Tern (*Sterna hirundo)* on Lake St. Lawrence, New York, by enhancing existing nesting sites and by creating new tern nesting habitat. The goal of the HIP is to increase the number of breeding pairs of this state-listed threatened species from about 400 nesting pairs to about 1400 nesting pairs. In April 2005, ten tern colonies were enhanced in an effort to increase the number of terns breeding on the Lake and the number of chicks these terns fledged. In addition to fencing, vegetation thinning, and chick shelter deployment, over 30 tons of pea gravel nesting substrate was transported by boat and spread by hand in these tern colonies. A tern nesting raft was also built and deployed to provide additional new tern nesting habitat. These enhancements resulted in a 15% increase in the number of nesting terns on the Lake and an increase in the average number of chicks fledged per nest from 1.5 in 2004 to 2.1 in 2005. The effects of these enhancements will continue to be monitored and additional improvements will be made in future years, dependent upon the result of the monitoring, to continue to increase the number of nesting pairs of Common Terns on Lake St. Lawrence.

Seasonal Anoxic Water Incursions by Pelagic Piscivores: Pelagic Food Web Modeling

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Community interactions and trophic niches have and continue to be extensively studied for many freshwater systems. Many of these studies focus on seasonal and diurnal assemblage trends for a diversity of species across several food web layers. However, due mainly to time constraints and issues of complexity, little extensive work has been performed investigating whole system interplay. This study has focused on understanding and modeling these relationships, using traditional net samplings and hydroacoustics, the interaction between food web structure and the annual onset of extensive anoxia within the pelagic waters of an Adirondack lake. Research to date has shown that increasing anoxia spatially compresses the lake's food web structure, resulting in species shifts and changes in diurnal migration patterns and assemblage partitioning. Of key significance is the first documented confirmation of seasonal use of anoxic waters by yellow perch and rainbow trout as a foraging ground for *Chaoborus* spp. larvae.

Training Local Decision-makers: A Habitat Approach to Biodiversity Conservation

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In 2001, Hudsonia's *Biodiversity Assessment Manual for the Hudson River Estuary Corridor* was published by the NYSDEC to help fill the gap in biological information available to land use decision-makers. Since then, Hudsonia has provided training and instruction in identifying and protecting important habitats. New York is a home-rule state, where municipal agencies have primary authority for land use decision-making. For this reason we offer our training to members of town boards, planning boards, conservation advisory councils, and watershed associations, and the staff of land trusts—individuals who have the greatest influence on land use decisions affecting biological diversity. The training program familiarizes participants with habitats of ecological significance, identification of habitats through remote sensing and field investigation, creation of habitat maps, and conservation strategies for protection of these habitats and the biodiversity they support. Over 200 participants have been engaged in our 10-month Biodiversity Assessment Training and 3-day Short Course, representing agencies from nine counties in the estuary corridor. After completing Hudsonia's programs, participants use their new skills to inform land use decisions in their own communities—by presenting their habitat maps to local officials and community members; by mapping new areas; by using remote analysis and field assessment to make environmental recommendations during site plan reviews; by incorporating habitat protection into master plans, open space plans and watershed protection efforts; and increasing the overall consideration of biodiversity protection during land use and conservation planning.

Dispersal of Timber Rattlesnakes to Shedding Sites, an Indicator of Summer Range?

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Twenty-eight (28) timber rattlesnakes (*Crotalus horridus*) captured at their den or in nearby basking areas were equipped with an external transmitter and their initial dispersal to shedding sites was monitored to provide an indication of each rattlesnake's summer range. Telemetry monitoring ended when each of the rattlesnakes shed its skin and attached transmitter. The initial dispersal of rattlesnakes from four dens indicated that dispersal from each den was not random and showed a directional preference by den possibly related to existing habitat and land contours. We proposed that after shedding rattlesnakes continued to move and use summer habitat in an expanded area that was more closely associated with their shedding location than with their den. Ten rattlesnakes with known den and shedding sites were equipped with an internal transmitter and their movements were monitored. We compared the initial dispersal rates/distances of rattlesnakes equipped with an external transmitter to rattlesnakes with an internal transmitter and found that the external transmitters did not significantly limit movements. We plotted each rattlesnake's summer home range using Kernel densities and found that their summer movements were between their den and their shedding site. Movement data reported for rattlesnakes in other studies suggests support of our findings. We discuss the application and use of external transmitters to study spring dispersal from dens to shedding sites and fall movements from capture locations to den crevices. The location of dens, shedding sites, and dispersal/ingress routes relative to study areas provides an indicator to select rattlesnakes for additional telemetry monitoring using internal transmitters.

Public Education and Invasive Species Interdiction at Adirondack Boat Launches

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Effective short and long-term invasive species management requires public education and boat inspection along with remediation. The Watershed Stewardship Program has worked since 2000 to raise recreational boat operator awareness at strategic public access boat launches in the northern Adirondacks. The program employs trained public educators to deliver short interpretive messages, distribute educational materials and inspect boats and trailers for clinging weeds during summer months. Recently, the program has gathered information which catalogs the points of origin for boats accessing targeted boat launches to increase understanding of the interconnectedness between waterways in the Adirondacks and those across the northeast. A three-year study of program effectiveness has determined that the Watershed Stewardship Program has been successful in raising the awareness of boat launch users as to the general threat presented by aquatic invasive species and the role of the recreator in avoiding the transport and introduction of these plants and animals.

Using Species and Natural Community Distribution Models to Predict Biodiversity Hotspots

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The New York Natural Heritage Program is using spatially-explicit habitat models (also called element distribution models or EDMs) to prioritize field inventories for rare species and natural communities and to generate better approximations of rare species and natural community distributions statewide. These models may also be appropriate for estimating site complexity or rare species richness. We evaluated this potential use by comparing predicted habitat richness in each of 15 sub-watersheds within the Salmon River Watershed in Oswego and Lewis counties in northern New York State. Thirty-six different environmental layers including elevation, slope, aspect, topographic wetness, topographic roughness, bedrock geology, soil pH, soil calcium carbonate, cation exchange capacity, land cover, precipitation, frost free days, and temperature were intersected with known species locations. We used the Maximum Entropy and Random Forests analytic techniques to evaluate these environmental/species presence combinations and predict similar locations statewide. We merged the Maximum Entropy and Random Forests predictions to create a final statewide map of predicted habitat for each species. We created EDMs for over 200 different species and natural communities and selected the subset of those with positive predictions within the 176,000 acre Salmon River Watershed. We will report on the spatial pattern resulting from synthesizing these EDMs and the applicability to site prioritization for conservation.

Southeastern New York Bog Turtle and Spotted Turtle Monitoring

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Bog turtle (*Glyptemys muhlenbergii*) surveys conducted in southeastern New York by the New York Natural Heritage Program during 2000 and 2001 identified several new bog turtle and spotted turtle (*Clemmys guttata*) populations in an unfragmented series of closely associated wetlands. With assistance from the New York State Department of Environmental Conservation, the Eastern New York Chapter of The Nature Conservancy, and multiple volunteers, intensive monitoring of both species was initiated in 2002 and continued through 2005. This monitoring effort focused on testing a standard protocol for monitoring bog turtles and spotted turtles, and on obtaining demography, viability, and movement data, as well as identifying additional occupied habitat in the surrounding landscape. Preliminary results indicate that this complex of wetlands supports large, viable populations of both species with the bog turtle population currently considered to be one of the top three populations in the state.

High-diversity Dry-rich Forests in the West Champlain Hills

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The rocky hills on the west shore of Lake Champlain support open oak-hickory forests with highly diverse floras on their southern and eastern slopes. The hills have had little previous study, and neither their communities nor their floras have been previously described. They are low, cliffy, dry, fire-prone hills with igneous bedrock. Our field work found an aggregate flora of about 300 vascular species. About 100 species were calcium requiring; 88 were near or at their northern range limits; 45 were rare in northern New York, and 58 did do not occur elsewhere in the Adirondack region. The rarest species and most diverse communities were in calcareous oak-hickory-hornbeam forests on south- and southeast-facing benches. I call these forests dry-rich communities. They differ in structure, floristics, and ecological processes from other rich forests in northern New York, and probably have their closest relatives in Massachusetts and western Vermont. They are of importance because of their unusual, range-limit flora; because they are higher in diversity and richer in rarities than any other Adirondack forests; and because very few are publicly owned or otherwise protected.

Adult Mortality in Rural Wood Turtle (*Glyptemys insculpta*) Populations

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In 2004 and 2005, we radiotracked 63 adult wood turtles for periods ranging from 1–2 years. Forty-four turtles were tracked for two complete years. We followed turtles in four streams in forested, agricultural, and residential landscapes. Eight turtles died during this period, a 7% annual adult mortality rate. Four turtles were killed by mowers in pastures and fields, one turtle was entombed during conversion of hayfield to corn, and one turtle was killed by an automobile. Four transmitting turtles were

attacked and injured by mammals: two males each lost a single front limb but survived one year of observation, one female sustained injuries to her front limb and died soon after, and another male was found dismembered near the stream. All mammal attacks occurred on riverbanks, and in every case raccoon tracks were the most frequently observed near the site. Agricultural (i.e., mower and plow) mortalities (n=5) occurred at two of four sites and accounted for 63% of all deaths. These figures are consistent with the findings of a recent study in Quebec (R. Saumure 2004), but are far higher than the observed mortality rates reported in previous wood turtle studies. Preliminary viability models indicate that this mortality rate is unsustainable and that these populations are probably declining.

Impacts of De-icing Salt on the Demography of Vernal Pool-breeding Amphibians

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De-icing agents, primarily road salt, are applied to roads in 26 states in the United States and in a number of European countries, yet the impacts of road salt on aquatic organisms remain largely unstudied. The issue is germane to amphibian conservation because both adult and larval amphibians are known to be particularly sensitive to changes in their osmolar environments. In a field study in the Adirondack Mountain Region of New York, road salt traveled at least 172 m from a highway into wetlands. Conductivity levels in roadside vernal pools in this relatively pristine environment were comparable to those in urban wetlands elsewhere in the region. Density of egg masses of spotted salamanders (*A. maculatum*) and wood frogs (*R. sylvatica*) was more than two times higher in forest pools than roadside pools, a pattern attributable directly to proximity to roads rather than water chemistry. Survival in embryonic and larval *A. maculatum* was reduced at moderate (500 µS) and high conductivity (3000 µS) levels, but those in *R. sylvatica* were affected only at the high level. A sensitivity analysis indicated that only at high conductivity would decreases in larval survival in *A. maculatum* and hatching success and larval survival in *R. sylvatica* be sufficient to strongly influence population dynamics of both species. Efforts to protect local populations of *A. maculatum* and *R. sylvatica* in roadside wetlands should, in part, be aimed at reducing application of road salt near wetlands with high conductivity levels.

Differential Habitat Selection in *Chrysemys picta* and *Chelydra serpentina* Metapopulations

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Census data compiled from 1997 through 2004 in Black Rock Forest (BRF), Orange County, NY, indicates the *Chrysemys picta* metapopulation (276 PIT tagged adults) of the 3785-acre preserve is differentially distributed amongst the seven ponds of the forest that each constitutes a discrete habitat patch. The presumed radiating source of the current metapopulation is the single natural pond which sediment coring indicates has been extant since glacial formation. Six anthropogenic ponds are 75–110 years old. Half of the adult metapopulation constitute a single local population within one anthropogenic pond. Other ponds have 9–12%, or 5-6% each. The *C. serpentina* metapopulation (51 PIT tagged adults) is distributed with three local populations of 20–24% each, including the glacial pond, three of 8–12% each, and one with 2%. Different factors that may have affected, and continue to affect, dispersal and distribution selection by the turtles were examined. The BRF watershed is high quality water, and the ponds are all part of the local water supply. Anthropogenic impacts such as pollution and habitat destruction are not contributing factors, though five of the artificial ponds have been drained at least once for maintenance. Within the forest, *C. picta* population density is positively correlated with dissolved oxygen, pH, and aquatic plant diversity/density. There is an inverse correlation with pond elevation. *C. serpentina* population density is positively correlated with pond elevation, and negatively correlated with dissolved oxygen, pH, and aquatic plant diversity/density. Additional physical water factors, aquatic insect diversity, and available nesting habitat need to be evaluated.

Noninvasive Surveys and Density Estimation for Fisher and Coyote

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Carnivores are notoriously difficult to survey with traditional trap-release methods because of their large ranges, rarity, and wariness towards humans. We assessed the value of four non-invasive techniques (track plates, camera traps, scat survey, snow tracking) for the detection and density estimation of fisher (*Martes pennanti*) and coyote (*Canis latrans*) in New York.

Camera traps and track-plates were approximately equivalent in detection efficiency of fishers, while scat surveys were inefficient. Camera traps detected fishers slightly faster but track-plates had a higher probability of detection (POD) given sufficient survey time. Cameras functioned poorly for discerning the presence of coyotes, while scat surveys were efficient (high POD). Snow-tracking surveys were particularly robust (high POD) for both species and may be the preferred detection method where conditions are suitable. We were able to identify individual fishers through the fine detail in their track plate footprints, and individual coyotes through genetic analysis of their scats. Most detections from a transect were from the same individual fisher, suggesting non-independence. Thus, data from traditional track plate deployments over small time periods cannot be used as a measure of abundance, but new study designs using print matching could obtain robust non-invasive, mark-recapture density estimates. Coyotes were responsible for 89% of the 377 scat samples we genetically identified. There was a linear relationship between the number of coyote scats collected at a site and the number of individual coyotes identified from that site, suggesting this is an accurate measure of abundance.

Managing Eurasian Watermilfoil in Upper Saranac Lake

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Upper Saranac Lake is a 4,725 acre water body with 44 miles of shoreline, 46% of which is publicly owned. Eurasian watermilfoil (hereafter called milfoil) was first detected in the lake in 1996. Limited hand harvesting of milfoil along privately owned shoreline began in 1999. Mid-summer lake surveys showed that milfoil was continuing to expand through the lake and thus limited control was not effective. A new control plan was initiated in 2004, wherein the entire shoreline will be hand harvested multiple times per season over three years to bring the milfoil population down to a level that can be managed in future years with a small crew. This plan requires 28 total personnel with an annual investment of about $500,000. To ensure worker accountability and to monitor effectiveness the crews fill out GPS referenced aquatic plant survey sheets at each work location. Data is added to a GIS database that allows spatial tracking of milfoil density through time. The AWI also tracks milfoil regrowth at several permanent monitoring sites located throughout the lake as an independent monitoring of hand harvesting control efforts. The AWI also conducts additional work at these sites to understand the distribution of milfoil and the effectiveness of control. At the end of the second season of the project (August 2005), milfoil density was dramatically reduced when compared to August 2004. Average milfoil height has also declined with repeated harvesting. Both the independent and harvest crew datasets suggest that the control plan is working.

Migration Patterns and Wintering Range of Common Loons in the Northeastern United States

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The Common Loon, *Gavia immer*, breeds throughout the northeastern United States. Several surveys have assessed the abundance and distribution of summering loons; however, migration patterns and wintering range have not been adequately documented. Satellite transmitters were implanted in 17 Common Loons (16 adults and 1 juvenile) that were captured on breeding lakes in New York, New Hampshire, and Maine during the summers of 2003, 2004, and 2005. Thus far, transmitters on 10 of the birds have provided adequate location data to document movement to wintering areas. In most cases, the adult birds appeared to travel non-stop from breeding lakes, or neighboring lakes, to the Atlantic Coast. Adult loons marked in New Hampshire and Maine wintered 151 to 240 km from breeding lakes, off the Maine coast. Adult loons marked in the Adirondack Park region of New York wintered along the coasts of Massachusetts (425 km), Rhode Island (363 km), and southern New Jersey (527 km). A juvenile bird from New York made a number of stops at lakes and reservoirs en route to Long Island Sound. Maximum functional life of transmitters deployed was about 12 months, providing an opportunity to document spring migration movements as well.

Japanese Knotweed Stand Characteristics and Associated Biota

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Fallopia japonica is a clonal herb of riparian, roadside, and urban habitats. We sampled two vigorous riparian stands in the Catskill Mountains, New York. We recorded vegetation, flora, and soil characteristics at 19, 5 × 5 m plots, or on 57, 1 × 1 m subplots. Basal diameter was a better predictor of knotweed shoot mass than was shoot height. Knotweed vegetation statistics were (median and range): canopy cover 87 (70–93%), litter cover 85 (55–97%), shoot density 7 (2–14/m^2), shoot basal area 2511 (403–7529 mm^2/m^2), aboveground dry mass 545 (72–2154 g/m^2), associated vascular species richness 2 (0–10 species/25 m^2). Knotweed leaf tissue loss to herbivory was 1–2% (mainly Japanese beetle, *Popillia japonica*). Knotweed canopy cover was correlated with litter cover, and richness of associated vascular plants was negatively correlated with litter cover. Soil C horizon thickness was correlated with litter cover and negatively correlated with richness of associated vascular plants. We identified 18 herbs, 6 woody plants, and 4 mosses in the 5 × 5 m plots; however, only garlic-mustard (*Alliaria petiolata*) was common. We found several hundred species of plants, fungi, and animals at knotweed stands in New York, New Jersey, and Massachusetts. Few animals graze knotweed, but many animals visit knotweed flowers, bask on leaves, or use the hollow dead stems for shelter. Northeastern knotweed stands support many associated species, but the impact of knotweed on biological communities needs to be elucidated.

Ten-year Study of Wetland and Upland Habitats Constructed for Blanding's Turtle

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Blanding's turtles are a Threatened species in New York, largely due to habitat degradation. In 1996–97 1 ha of wetland and 3 ha of nesting habitat were constructed to mitigate the loss of habitats destroyed during a school expansion in Dutchess County, NY. Organic sods with intact herbaceous and shrubby vegetation were moved from the destroyed wetland to the constructed wetlands to accelerate development of the flooded, shrubby, organic-soil pools favored by Blanding's turtle in Dutchess. The project included a 1300 m fence on two sides of the mitigation area, with one-way turtle "gates" to reduce the risk of turtles leaving the area and entering parking lots or highways. We collected one season of pre-construction data and are now in the tenth year of post-construction study of turtle activities, hydrology, soils, and vegetation. Adult Blanding's turtles immediately used constructed wetlands in the nesting season and summer, and nested on constructed upland habitats. In constructed wetlands, Blanding's turtles were associated with less cover and warmer water than in nearby natural wetlands. Constructed wetlands provided basking and foraging habitat in the spring and early summer, and staging or rehydrating areas for nesting females. Nesting females selected soils with more gravel in wetter spring seasons and more sand in drier seasons; hatchling productivity and length/weight ratio did not differ among years. Adult use of constructed and natural wetlands has been closely related to water levels. Our studies have produced information for restoration and management of Blanding's turtle habitats where this is necessary.

Nearshore and Deepwater Benthos Communities of Brooktrout Lake 1987 and 2005—A "Recovering" Clear Water Acid Lake

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The dynamics of the benthos community of Brooktrout Lake were studied at nearshore and deep-water sites in 1987 and in 2005. Species richness and community abundance decreased with depth except immediately after fall turnover. In 1987, deep water benthos abundance increased from a springtime low of less than 1,000/m^2 to more than 10,500 in late September. The deep water community was dominated by larvae of the chironomid, Phaenopsectra sp., but Procladius and Micropsectra were also abundant in late summer and at turnover, respectively. Micropsectra, Tanytarsus, Heterotanytarsus and Dicrotendipes were the most common chironomids of the near shore stations. The littoral cladoceran, Acanthloberis curvirostris, annelids, nematodes and mites were also abundant in the 1987 nearshore. In 2005, the deep water benthos also exhibited an increasing trend in abundance from springtime levels of roughly 200/m^2 to more than 3,000/m^2 in early August. Overall abundance, however, was substantially lower than in 1987, likely a result of depleted oxygen levels resulting from higher productivity in the upper waters. Richness (subfamily level) of deep water benthos differed between the 2 years, with 1987 represented by more taxa; in both years, chironominae were most abundant. Richness (subfamily level) and seasonal trends in abundance of nearshore benthos did not differ substantially in 1987 and 2005. The contribution of subfamilies to total nearshore benthos abundance, however, was more evenly distributed in 1987; in 2005, chironiminae dominated the benthos. In 2005, additional sampling was conducted in nearshore areas, which documented a variety of invertebrate taxa and breeding amphibians, including 2 groups of acid-intolerant species, mayflies (Families: Caenidae, Leptophlebiidae) and fingernail clams (Family: Sphaeridae).

An Examination of Skeletal Morphology in *Marmota monax* Following the Wisconsin Glaciation

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The woodchuck, *Marmota monax* (Linnaeus, 1758), is common in northeastern North America but its morphologic and biogeographic history is poorly documented in this region. The current study uses standard morphometric techniques to compare modern and fossil specimens to document morphological change during the transition from the Pleistocene to Holocene. Normal sources of intraspecific variation (such as bilateral asymmetry, geographic variation and sexual dimorphism) are assessed by measuring modern specimens. This study supports findings by Kurtén and Anderson (1980) which include: an increase in body size, enlargement of the P_4, modification of the molars and increased post-cranial specialization for fossorial locomotion. One of the objectives of this study is to discriminate whether changes in size can be attributed to the shifting of sub-specific range boundaries due to climatic change or true evolutionary change. Preliminary data indicates modern woodchucks from the north-eastern portion of their range may be more similar in morphology to fossil specimens. This similarity suggests that woodchucks which migrated north with the retreating glacier have retained a primitively cold-adapted morphology, while those that remained in the south adapted to the warming climate in that region.

Landscape Predictors of Hotspots of Herpetofauna Road Mortality along a Highway Network

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Road mortality is often spatially concentrated at 'hotspots', and there is a need for models that accurately and efficiently predict hotspots within a road network for mitigation. In July 2002, I surveyed 145 points distributed throughout the entire 353 km highway network in four towns of Northern New York State, USA (976 km^2) for road mortality of reptiles and amphibians. I analyzed the survey data in relation to habitat composition, wetland configuration, and road characteristics to identify landscape and road features that best predicted hotspots of road mortality for herpetofauna. Mortality hotspots were situated where the surrounding landscape was comprised of wetlands and forest, on highways that were heavily used and which were raised above the surrounding landscape. Land cover within 100 m of the road was more accurate than smaller or larger spatial scales at indicating road mortality hotspots. Overall, the best predictor of hotspots was the presence of a causeway configuration of wetlands: wetlands on both sides of the road within 100 m of it. Nearly 4% of the highway expanse within my study area was in a causeway configuration, and thus at risk of having elevated road mortality. These results indicate that accurate predictive models of hotspots of reptile and amphibian road mortality are possible, using publicly available data on land use, wetland features, and road characteristics. Such models have great potential for aiding policy makers and resource managers when planning new roads and selecting sites for barriers, passageways, and other methods of mitigation on preexisting roads.

Mammalian Road Crossing Patterns along a Major Highway at the Landscape Scale

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The over 6.5 million km of roads that dissect the U.S. landscape have three principal impacts on wildlife: (1) direct habitat loss, (2) habitat fragmentation and isolation, and (3) as a mortality source. These impacts combine to produce the loss of over 16,000 km^2 of habitat, countless undocumented barrier effects, and an estimated 1,000,000 road-killed vertebrates per day. This study was designed to examine the spatial distributions of mammal road crossing locations and investigate their relationships with landscape variables, including under-road passageway usage as an alternative means of road crossing. Studies were conducted for one year (including all seasons) along a 150 km of Interstate-87 within Adirondack Park, NY. We surveyed this stretch for road-kills weekly, and also performed snow-tracking surveys to document both unsuccessful crosses and successful crosses. Nineteen under-road passageways were monitored during this study with track-plate structures and infra-red triggered cameras. Forty-three road-kill surveys yielded 220 individuals (19 species). Four snow-tracking surveys recorded 116 road crossings (6 species). Both road-kill locations and successful crosses were spatially clustered ($p<.001$). Under-road passageway monitoring produced 834 passes by 24 species. In summary, mammals in this region frequently utilize under-road passages, but also cross this major highway throughout the year. These cross-road movements result in substantial mortalities, but they are spatially clustered, appear to be associated with features of the surrounding habitat, and are, thus, predictable. These studies provide important insights for those attempting to design or modify roadways in an effort to minimize their impact on wildlife.

Acid Rain Effects on Western Adirondack Stream Chemistry

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Although extensive information on the chemical condition of Adirondack lakes is available, relatively little information is available on streams in this region. Therefore a synoptic survey was conducted in the Oswegatchie and Black River drainages, where acid deposition levels are among the highest in the U.S. Only streams accessible within a 1-hour hike from the nearest road were identified for possible sampling, and streams with upstream lakes or ponds that affected more than 25 percent of the drainage area were excluded. Of the 565 streams that met these criteria, 200 were randomly selected for sampling. Samples were collected during a high flow period on October 27–29, 2003, and during snowmelt, on March 29–31, 2004. In October 2003, concentrations of inorganic monomeric Al in 54 % of the streams exceeded 2 μmol L^{-1}, the threshold above which biota are negatively affected. Values of ANC in 66 % of the streams were below 50 μeq L^{-1}, and values of pH in 64 % of the streams were below 6.0, both thresholds below which ecosystems are considered at risk. Although flows in March were generally lower, the percentages of streams that were negatively affected were similar to those in October. Inorganic Al concentrations exceeded 2 μmol L^{-1} in 45 percent of the streams, ANC values fell below 50 μeq L^{-1} in 70 percent of the streams, and pH values fell below 6.0 in 64 percent of the streams.

Status of Piping Plover and Least Tern Productivity at Long Island State Parks

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Federally threatened piping plovers (*Charadrius melodus*) and state threatened least terns (*Sterna antillarum*) nest at 8 coastal state parks on Long Island oftentimes in the same areas where millions of people come to recreate. Major recreational events such as the Jones Beach Memorial Day Weekend Air Show and the Jones Beach 4th of July Fireworks Program could have direct and indirect effects to endangered species. Since State Parks has assumed responsibility for the protection of piping plovers and least terns, populations for these two species have increased and plover productivity has often met or exceeded USFWS recovery goals. This is possible because of the implementation of site specific management plans and endangered species protection plans for major events. We will present the primary elements of the plans as well as the annual data on plover populations in State Parks on Long Island.

Northern Saw-whet Owl Migration in Allegany State Park, New York

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The Northern Saw-whet Owl (*Aegolius acadicus*) is locally recognized as an occasional breeder (Saunders 1942, Beardslee; Mitchell 1965, Eaton 1981, Levine 1988) and considered a rare fall and spring migrant in the Allegany State Park area (Eaton 1981). I will report preliminary results of an on-going survey, initiated in 2004, to assist in understanding the autumn Northern Saw-whet Owl migration in Allegany State Park. Thirty-nine Northern Saw-whet Owls were captured using an audio lure and mist-nets. One foreign recaptured bird was caught that originated from Prince Edward Point, Ontario, Canada. Average capture time was 4.75 hours after sunset with 3.1 birds captured per 100 net hours. I captured 71.8% females with both hatch year and after hatch year birds captured 48.7% of the time. These data indicate that Northern Saw-whet Owls use Allegany State Park as a migratory pathway during the autumn season.

Priority Bird Species: Looking Beyond NY's Endangered, Threatened and Special Concern List

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Many conservation efforts focus on species that are listed in the state as endangered, threatened, or of special concern. This approach is necessary and effective for helping species that are vulnerable to local extirpation. However, by not taking into consideration a larger context when identifying species, it fails to identify species that are vulnerable at a continental scale yet may be relatively abundant in the state. In addition, it is more reactive than proactive, resulting in a late start in addressing the

conservation of these species. A complementary approach is to include species that are vulnerable at the continental scale and also species of concern that have a large proportion of their population found in our region and are, therefore, considered to be of high regional responsibility. By addressing these additional species, local conservation efforts can have a greater impact on a species' overall population and prevent some from becoming endangered. Audubon New York's Important Bird Areas (IBA) program developed a comprehensive list of priority bird species based on a species assessment process developed by Partners in Flight that includes species of continental concern and species of regional responsibility. The process assessed a variety of factors including population trend, population size, range, and threats, as well as relative abundance in the region. The IBA program recently identified 136 sites that are critical to these species by applying a set of criteria, including site specific thresholds for the most vulnerable species, and assessing new and existing data.

Mapping the Footprint of Rare Dragonflies and Damselflies in Massachusetts

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As a Heritage Program, Massachusetts tracks 31 species of dragonflies and damselflies that are considered to be rare and imperiled. Over the past 5 years, protection for rare Odonates has evolved into a much more sophisticated methodology, including mapping known and inferred habitat for all state-listed Odonates. These maps have several applications, ranging from informing and prioritizing land protection efforts, regulation under the Massachusetts Endangered Species Act and Wetlands Protection Act, and highlighting "no-spray" zones for mosquito control efforts. I will discuss challenges to developing mapping methodology, solutions and compromises, and future plans to strengthen Massachusetts protection of rare Odonates.

Impact of Silvicultural Practices on Leaf Litter Amphibians in the Adirondacks

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Impact of silvicultural practices on leaf litter amphibians was studied at two sites in the north central section of the Adirondacks State Park. Four 22.56m diameter circular plots at the center of two-hectare control (C), clear cut (CC) and single-tree cut (SC) experimental blocks at each site were surveyed prior to treatment (June 30–July 14, 1999) and after treatment (June 23–July 8, 2000, June 19–27, 2001 and July 3–6, 2003). The study identified five species of salamanders (*Ambystoma maculatum*, D*esmognathus ochrophaeus*, *Eurycea bislineata*, *Plethodon cinereus* and *Notopthalmus viridescens*) and three species of frogs/toads (*Bufo americanus*, *Rana sylvatica* and *Pseudacris crucifer*). Eight hundred and sixty one observations were made in the four years of study. The number observed in 1999 was 267, declined to 210, 215 and 173 in 2000, 2001 and 2003, respectively. Both CC blocks combined exhibited significant reductions, representing 33% (n = 86) of the total in 1999, 17% (35) in 2000, 10% (22) in 2001, and 3% (5) in 2003. SC blocks, in contrast, represented 45% (117) in 1999, decreased to 40% (83) in 2000, but increased to 50% (107) in 2001, and 53% (92) in 2003. C blocks represented only 24 % (64) in 1999 but increased to 42% (88) in 2000, 40% (85) in 2001 and 43% (74) in 2003. Species diversity in CC and SC blocks decreased significantly, between 1999 and 2000 and remained significantly lower in the CC blocks in 2001 and 2003. In contrast species diversity in the SC blocks bounced back.

Feasibility of a Champlain Canal Aquatic Invasive Species Barrier

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Species exotic to, but now established in Lake Champlain total 47 fish, molluscs, crustaceans, plants, and other organisms. This number is relatively small as compared to exotics in the Great Lakes (160), St. Lawrence River (87), and the Hudson River (113) all of which connect to Lake Champlain via the Champlain and Chambly canals. The major vector for exotic species introductions into Lake Champlain has been canals; 60% of the 26 invaders for which invasion routes can be guessed at entered the lake via the canals. While complete economic impact of exotic invasive species is lacking, direct expenditures associated with the management of exotic sea lamprey, water chestnut, and zebra mussel in the lake now total at least $800 thousand per year. Evidence strongly suggests that new invasions will precipitate additional ecological costs and/or greater expenditures, absent any invasive species barrier in the Champlain Canal. Several old and innovative technologies exist that could be employed to stem further invasions. Workshops, surveys, literatures reviews, and other methods were used to pose and examine six alternative canal operation/management strategies that could address this invasive pathway. Total cost estimates associated with these

strategies are yet to be developed. However, available evidence suggests that an invasive species Champlain Canal barrier using 1) temporal hydrologic separation, 2) overland boat transport, and 3) specialized lock operations, could be justified based on available ecological and economic analysis.

Strategic Planning for Regional Progress: The Adirondack Park Aquatic Nuisance Species Management Plan

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The proliferation of aquatic nuisance species (ANS) is a top threat to water quality, ecosystem health, and the economy of the Adirondack State Park, a 2.4 million hectare park in upstate New York. In 2005, at least 49 waters were reported with aquatic invasive plant infestations, and efforts to track other ANS have been limited. Impacts of ANS will continue to increase if current populations of ANS are left unchecked and new species of ANS enter the Park. The Adirondack Park Aquatic Nuisance Species Management Plan (the Plan) was drafted to facilitate the coordination and enhancement of ANS management efforts throughout the Park. Developed by 11 cooperating organizations, peer reviewed, and vetted at the Paul Smith's College 2005 Adirondack Water Quality Conference for public comment, the Plan identifies three goals: 1) preventing new ANS introductions, 2) limiting the spread of established ANS populations, and 3) abating negative impacts resulting from existing infestations. Implementation components of the Plan include coordination, enforcement, legislation, education and outreach, early detection and monitoring, management, restoration, and research. It is estimated that $8.5 million will be needed per year to implement the Plan. Implementation strategies and progress to-date will be discussed.

Amphibian Behavior in Response to Car Traffic

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Nocturnal car traffic often results in amphibian casualties, especially during rainy nights. The behavior of amphibians presumably influences their vulnerability to mortality on the road, but this hypothesis remains untested. We investigated the behavioral response of six species of amphibians on roads when confronted by an approaching vehicle. We first conducted a field study consisting of 50 night-driving surveys over 4 yr during which we recorded the behavior (i.e., moving or immobile) of frogs, toads, tree frogs, and salamanders encountered on a 20-km stretch of road. In an effort to tease apart the effects of headlights and the sound of motors on amphibian behavior, we carried out a field experiment on a test road where we exposed individuals to different car-associated stimuli. Based on the observations of the 2767 individuals in the field survey, immobility was the most common response to the approach of a car (probability of 0.82 of remaining immobile); the response differed across species but depended on the season of the survey. Similarly, the 91 individuals included in the field experiment were more likely to move during the control treatment than during any of the car-associated treatments. The combined stimuli (headlights + sound of motor) elicited the strongest response, followed by the headlights-only and the motor-only treatments. Both the field survey and the experiment consistently indicated that amphibians tend to remain immobile at the approach of a vehicle. This behavior highlights the vulnerability of amphibians to traffic and should be considered in measures to mitigate road impacts.

Vascular Plant Community Recovery in Post-Cultivation Second-Growth Forests Across New York

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New York currently contains 18.6 million acres of forests, one-half of which are secondary woodlots in various stages of succession following widespread farmland abandonment that began ~1880. Years of soil cultivation left no live roots, or seed/spore banks to facilitate vascular plant community recovery and, therefore, many native forest herbs that lack long-distance dispersal mechanisms, have low germination and/or seedling survivorship rates, or have slow clonal expansion rates may experience substantial bottlenecks in colonizing New York's widespread post-cultivation second-growth forests. I compared vascular plant community composition and species colonization rates at 36 paired, primary and secondary woodlots across New York that ranged in age from 50–98 years and in soil pH from 3.5–6.7. Throughout the state, and across the range of site conditions herb stratum communities in secondary woodlots were discernible from those in contiguous primary woodlots. Although many species occurred in both the primary and secondary woodlots, several primary woodland herb indicator species were identified, many of

which have advanced little more than 5–10 m into post-cultivation second growth stands from their refugia in adjacent primary stands. These data indicate that, although forest cover has increased throughout NY over the last century, complete reassembly of herbaceous plant communities has not occurred and may require substantial periods of time to achieve.

Non-surgical Attachment of External Transmitters on Timber Rattlesnakes for Monitoring Short-term Movements

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During the course of treating an injury to a timber rattlesnake (*Crotalus horridus*) in 1996, we discovered that Tegaderm (3M Health Care), a durable, non-irritating, flexible but non-elastic adhesive remained securely in place until it was shed with the snake's skin. These properties make it a suitable material for the attachment of small external transmitters to snakes, a less invasive alternative to surgical implantation of transmitters which is currently the norm in snake studies. Advanced Telemetry Systems R1630 transmitters, weighing 3.6 g, and Holohill BD-2G transmitters, weighing between 1.25 and 1.85 g, were attached dorsolaterally at approximately three quarters of the length of the adult snakes, snout to vent, We used smaller Holohill BD-2A transmitters weighing between .62 and .80 g on ca. two-week old post-shed neonatal rattlesnakes. Antennae were cropped to 8 to 12 cm to reduce drag without significantly reducing signal strength, which was similar to that of internal transmitters. Advantages of the technique include the ability to telemeter large samples of rattlesnakes (40 to date) without the risks and costs of anesthesia and surgery (implantation and removal), the easy retrieval of shed transmitters for refurbishing, safe use on gravid females, and a viable alternative for snakes found late in the season when surgical implantation is contraindicated. Late season transmitter attachment also facilitated the pinpointing of winter hibernacula.

An Overview of Centipedes (Chilopoda) in New York State, and North America

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Centipedes represent one of the top invertebrate predators in the biosphere, but at the same time they provide an abundant food source for animals ranging from other arthropods to mammals. For this reason, they are important components of our ecosystems. Relatively little work has recently been done on these organisms for North America. An annotated catalog of the North American centipede fauna north of Mexico is nearing publication and this compiled information is intended to create a solid foundation for future researchers. New York State has approximately 39 species of indigenous centipedes; however, the actual number may be considerably less once their taxonomy is reexamined. Unfortunately, there are a handful of introduced species established in New York and their ecological impact is currently unknown. A new report of a non-indigenous centipede found on Long Island will be briefly discussed.

Expansion of the USGS National Biological Information Infrastructure for the Northeastern U.S.

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The National Biological Information Infrastructure (NBII) (http://www.nbii.org) is a broad, collaborative program sponsored by the United States Geological Survey (USGS) designed to increase access to data and information on the nation's biological resources. The NBII links diverse, high-quality online biological information, data products, analytical and mapping tools within a region or topic area and fosters development of standards, tools, and technologies that make it easier to find, integrate, and process information resources on biological systems and their components. In partnership with the USGS, the Center for International Earth Science Information Network (CIESIN) has created the Northeast Information Node (http://nin.nbii.org). This regional on-line data portal has begun projects supporting: the Invasive Plant Atlas of New England (IPANE), the Hudson River Corridor, Northeastern forest systems and biodiversity research projects in the New York City metropolitan area, among others. This presentation will overview the scope and details of these as well as upcoming efforts, as well as provide details of how to explore porting your projects and biological information layers through the portal and mapping tools.

Ecosystem Integrity in Adirondack Upland Headwater Catchments: A Comparison of Reference and Logged Catchments

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Catchment scale characteristics and land use practices were used to define and assess ecosystem integrity in Adirondack upland headwater catchments to compare systems managed for timber harvest and reference sites located in the New York State Forest Preserve. A suite of habitat variables describing catchment geomorphology, water chemistry, surface water hydrology, and channel habitat were determined for comparison to biotic response variables (stream biota and upland plant community composition). Watershed geomorphology was similar between land use types. However, Forest Preserve streams tended to have deeper and wider channels (despite steeper channel slopes), while streams in logged watersheds had more stored organic matter and finer substrate. Stream hydrology showed a higher baseflow maximum discharge in Preserve systems. Several water chemistry variables differed between logged and Preserve systems with seasonal increases in nitrate and soluble reactive phosphorus in Preserve systems and TSS in managed systems. Over 175 macroinvertebrate taxa were recorded in the streams, and taxa richness was significantly reduced in managed watersheds ($p=0.006$). Fish (Brook trout) had higher biomass and density in managed sites. Forest community composition and riparian plant communities also showed differences between managed and Preserve catchments. Multivariate comparison of this complex data set suggests that, in general, catchment scale variables are important drivers for many biotic and chemical responses in small Adirondack headwater systems.

The Adirondack All-taxa Biodiversity Inventory Initiative

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An all-taxa biodiversity inventory (ATBI) is an information-gathering process supported by scientists and citizens to learn about the biodiversity of a specific place. In the Adirondacks a diverse group of individuals from public, private, academic, and governmental organizations have come together to develop a plan and rally support for an Adirondack ATBI initiative. The mission of the Adirondack ATBI initiative is to survey the diversity of life and connect people to the natural world through participation in biological inventories and related activities within the Adirondack Park of New York State. A project plan has been drafted which outlines a course of action to implement an ambitious and innovative ATBI model that combines scientific inquiry with active citizen participation. The plan has two broad themes: biodiversity survey and citizen participation. The biological survey has four goals: 1) perform the biodiversity inventory within an ecosystem and conservation framework, 2) coordinate among taxonomic working groups and the biodiversity inventory process, 3) develop and maintain a temporally and spatially-referenced database, and 4) coordinate with other ATBIs. Citizen participation has two goals: 1) community involvement and active citizen participation, and 2) appreciation of place-based biodiversity through art, culture and community.

Habitat of Death of the Hyde Park, New York, Mastodon and other Mastodons in the Great Lakes Region

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The skeleton of a male mastodon (age 11,480 ± 40 ^{14}C yr B.P.) was recovered in 1999 and 2000 near Hyde Park, mid-Hudson Valley, from sediments of a small oxbow depression as it was being enlarged to improve a backyard pond. Undisturbed sediment above and below the bones was used for plant macrofossil analysis. Fossil leaves and needles from the sampled section were radiocarbon dated by accelerator mass spectrometry. Sediment in the oxbow accumulated by over bank deposition from ~13,000 to 12,220 yr B.P. during a period of tundra vegetation, which ended with an abrupt rise in spruce needle deposition and the onset of marl accumulation. Aquatic, wetland, and upland moss and vascular plant fossils established the composition of vegetation in the basin and on surfaces above it. When the mastodon died, rich fen and calcareous water occurred in the oxbow pond, while the nearby upland supported open white spruce and later white spruce-balsam fir-tamarack forest. The basin ceased to accumulate sediment near the Pleistocene/Holocene transition and after the mastodon bones had been buried in about 2 m of marly and finally acidic peat, both remaining beneath the water table. Modern vegetation at the Hyde Park site was a swamp dominated by deciduous trees, but the mastodon died when the wetland was successionally at an early calcareous wetland stage

and not a later acidic one. At other well-studied mastodon sites in the Great Lakes region, mastodons also died in wetlands containing calcareous water, whereas the contemporary vegetation was acidic fen, sometimes mistakenly called "bog." This led to the widely cited concept that mastodons lived in bogs, when actually they may only have visited calcareous fens periodically as a source of minerals and sometimes food.

The Changing Flora of the New York Metropolitan Area

Moore, Gerry and Steven E. **Clemants** (Department of Science, Brooklyn Botanic Garden, Brooklyn, NY 11225)*

Over 100 years of herbarium specimen data for woody plants in the New York metropolitan region has been analyzed in order to measure the floristic changes of this area. Change Index values have been computed for 224 of the region's 556 woody species to provide a specific measure of whether these species are expanding, contracting, or stable. The results show that, in general, nonnative invasive species are spreading rapidly in the region, while native species are in slight decline. Specific examples in many genera (e.g., *Lonicera, Celastrus*) are provided that highlight these two general trends. Besides these trends shown in this meta-analysis, additional examples are provided in other groups (e.g., aquatic and wetland plants) that also show the decline of our native species and spread of non-native species. It is further concluded that the influx of non-native species is making the process of plant identification more difficult, since many species that now occur in the region are not given in many regional identification manuals. NYMF staff are currently preparing interactive keys for all vascular plant species growing in the area.

Health Assessment of Black-crowned Night Herons in New York Harbor Estuary

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The health of NY Harbor is in a constant state of flux due to declines in certain contaminants (PCB's, certain pesticides), increases in other contaminants (heavy metals, other pesticides), dredging practices, and changes in local and regional water quality. Black-crowned Night Herons (*Nycticorax nycticorax*), a species nesting on multiple islands in the NY Harbor, serve as excellent indicators as they can accumulate toxins. Because the herons are top predators and generalized feeders, and because adults forage in different places in NY Harbor depending on which colony they are nesting at, they serve as environmental sentinels, or health proxies, for specific regions of the NY Harbor Estuary ecosystem. In an effort to assess the health of the NY Harbor ecosystem, we collected blood, feather and regurgitant samples from heron chicks on North Brother, Goose, Hoffman, and Canarsie Pol Islands in 2004 and 2005. Blood samples were analyzed for hematologic health parameters: packed-cell volume (PCV), total plasma solids (TS), white blood cell count (WBC), and differential white blood cell counts. WBC was significantly different between North Brother (24,131 cells/μl ± 2,520) and Hoffman (15,487 cells/μl ± 1,466) in 2004. WBC on North Brother was higher than on Hoffman. Biochemical blood analyses, feather metal concentrations, and contaminant concentrations in prey items are currently underway and will complete the assessment of the effects of contaminants on the health of herons in NY Harbor.

Overview of Three Decades of Change in the Chemistry and Biota of Brooktrout Lake

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Brooktrout Lake is a relatively small, high elevation water located in the southwest quadrant of the Adirondack Park (New York), an area in the northeastern US most susceptible to the effects of acid deposition. Reports from the late 1800s and later, in the 1950s, extol the abundant brook trout fishery that occurred in this water. Data collected by the New York State Department of Environmental Conservation during the 1960s, 1970s and 1980s described the loss of the fisheries resource in this lake, presumably from acid deposition, as well as changes in other biotic components towards a more simplistic, acidified food chain without fish as the top predator. Two survey programs initiated following the 1990 Clean Air Act Amendments have documented significant improvements in water chemistry in terms of rising pH and alkalinity, and biology in terms of increased productivity and community changes in phytoplankton and zooplankton. In view of these improvements, efforts were made during November 2005 to restore the brook trout fishery in the lake. The purposeful re-introduction of fish to Brooktrout Lake, or any water body demonstrating the same recent water quality trends, is necessary if scientists and regulators want to document and understand the process of biological "recovery" from acidification. The results of the Brooktrout Lake fish restoration effort are being scientifically evaluated by monitoring Lake water quality and the "introduced" fish over the short- and long-term.

Twelve Years of Grassland Bird Research in the Northeast: Perspectives and Issues

Norment, Christopher J. and Sarah A. **Lazazzero** (Department of Environmental Science and Biology, State University of New York College at Brockport, Brockport, NY 14420)*

Grassland birds are declining throughout North America due to the loss and deterioration of grassland habitat. Culturally altered landscapes, such as the vast agricultural grassland of Jefferson County, NY, receive the periodic disturbance needed to maintain grassland habitat. A recent study completed in Jefferson County demonstrated that nonnative cool season grass hayfields and pastures supported obligate grassland bird densities comparable to those on 13 National Wildlife Refuges in the Northeast, although fields in Jefferson County were randomly selected, privately owned and not specifically managed for breeding grassland birds. The study also indicated that predictor variables related to area explained the most variance in grassland bird abundance. In addition, grassland breeding bird productivity in nonnative cool season grasslands in Jefferson County and other areas of western New York is higher than in many parts of the Midwest, particularly in non-fragmented habitats. In contrast, many anthropogenic warm season grasslands in the region support few grassland birds, and may have relatively low productivity. Results of twelve years of research on grassland birds in New York conducted by SUNY Brockport faculty and students, along with work by many other researchers, suggest that the large expanses of anthropogenic grasslands in New York are an important regional and continental resource for grassland bird conservation, and that management efforts should incorporate privately owned land in agricultural landscapes, maintain large areas of grassland habitat and promote the use of cool season grasses.

The New York Dragonfly and Damselfly Survey: First Year Progress and Results

Novak, Paul and Charlene **Houle** (New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY 12233-4757)*

The New York Dragonfly and Damselfly Survey (NYDDS) is a 3-year, volunteer-based, statewide, survey of the distribution of all odonate species in New York State. Work on the project began in late March 2005 with the adaptation of a previously designed plant label database to serve as the database for NYDDS. A Handbook for Workers, survey data sheets, a NY Species list, and other materials for participants were developed and individuals with a long-standing, or newly developed, interest in odonates were contacted. Over 90 individuals attended one of six separate introductory workshops held in various locations throughout the state during June of 2005. Media attention included a NYSDEC Press Release issued on July 20 and subsequent articles in several newspapers. As of February 2006, 169 individuals have registered as participants for the project. Records (specimens, photographs and/or observations) have been received from 40 different individuals for the 2005 field season. Incorporation of all 2005 records into the project database is nearly complete. Records include close to 1,100 specimens, the majority of which will be deposited in the collection of the New York State Museum. Maps showing the locations of submitted records, as well as examples of dot maps by habitat and species are presented. One new species, the Double-ringed Pennant (*Celithemis verna*) was recorded for NY State for the first time.

Japanese Knotweed Control along Road Corridors in Blue Mountain Lake, New York

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Japanese knotweed (*Polygonum cuspidatum* Seib. & Zucc.) is a critically important, non-native, invasive plant that is spreading throughout the Adirondack Park. Knotweed appears to be in an early stage of invasion and therefore may be controllable with intensive management. An integrated strategy is clearly needed, especially given the complex of environmental and social concerns in the Park. Herbicides are an important treatment for controlling knotweed. Site-specific research will be needed in order to minimize direct costs and environmental impacts associated with herbicides and other control treatments. Such research began in part in summer 2004. A select set of knotweed clumps on roadsides in Blue Mountain Lake were treated by The Nature Conservancy's Adirondack Chapter and the New York State Department of Transportation. Two different herbicide methods were compared: cut-stump (glyphosate) and foliar (mix: glyphostate, imazapyr, and metsulfuron). One-year post-treatment, knotweed was controlled, but not eradicated by the herbicide treatments. Knotweed cover was reduced with both herbicide treatments as compared to untreated controls (2–3% cover for herbicide, 80% for untreated control), but only the foliar treatment reduced stem density (7,000 stems per hectare for foliar, compared to 54,000 and 47,000 for cut-stump and untreated control, respectively). Percent cover of other plants was not different among treatments, averaging less than 15%. Monitoring will continue for at least one more year to elicit full treatment effects. Subsets of clumps may have follow-up treatments. Research should be expanded to other populations of knotweed in the Park.

Dogs vs. Butterflies: Public Access in Endangered Species Habitat

O'Brien, Kathleen M. (Endangered Species Unit, New York State Department of Environmental Conservation, Albany, NY 12233)*

Populations of the state and federally endangered Karner blue butterfly (*Lycaeides melissa samuelis*) have declined by over 90% in New York State. Efforts to reverse this decline and recover the species include protection of existing habitat and creation of new habitat. Success of recovery hinges on set aside and management of lands for habitat. In general, public access to these areas has been seen as a benign and even desirable secondary use for these sites. However, a situation that resulted from improved public access to a Karner blue butterfly habitat area at Saratoga Spa State Park in Saratoga Springs, NY illustrated a problem that land managers need be aware of. Creation of a parking area at this site encouraged greater use of the minimal trails through the area, while a reference to it as a "dog park" by a local newspaper brought people to the site chiefly for the purpose of running their dogs off-leash. This resulted in greater impact on trails, creation of new, un-authorized trails and trampling of habitat. Changing people's behavior at this site was achieved only by a concerted effort by staff of the Office of Parks, Recreation and Historic Preservation and the Department of Environmental Conservation. In light of the increasing pressure of new housing developments, this issue has implications for management of other areas that may be set aside for the Karner blue and for other endangered species.

Invasive Plant Control Planning at Minnewaska State Park Preserve: A Working Model

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Invasive plants are second only to habitat loss as a threat to our biodiversity. Minnewaska State Park Preserve, a 17,563-acre New York State Office of Parks, Recreation and Historic Preservation (OPRHP) park preserve located in Ulster County NY is located within the Northern Shawangunks, one of the most important sites for biodiversity conservation in the Northeast. The Preserve is home to significant natural communities, five of which are globally rare. It contains many rare and state-listed threatened or endangered species. Preserve staff has identified invasive plants within the boundaries of the park preserve and surrounding park border lands. The management and removal of invasive species has risen to a level of priority within the state and OPRHP. As invasive plants threaten the significant biodiversity of the Minnewaska State Park Preserve, it is fitting that an invasive species management plan be developed. The approach and goals of the plan will be discussed, as well as development of an invasives database, mapping, ranking invasives, prioritizing management projects, and monitoring and protecting the biodiversity of Minnewaska State Park Preserve. OPRHP intends to use this plan as a model for additional park and regional invasive species plans.

An Integrated Approach to Regional Invasive Plant Management in the Adirondack Park

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The Adirondack Park is arguably New York's best chance at preventing invasive plants from spreading before it is too late. The Adirondack Park Invasive Plant Program (APIPP) is a two-time, national award-winning program protecting the Adirondacks from the real and lasting negative economic and environmental impacts of invasive plants. Initiated in 1998 and formalized in 2003, the Program is a partnership of state agencies, not for profits, and resident groups. Partners developed an integrated management plan to expand partnerships with communities across the region, and inventory, map, monitor, and eradicate infestations to prevent the spread of certain targeted invasive species in the Adirondacks. Program successes include developing a regional volunteer monitoring program to detect aquatic invasive plants; recruiting 190 staff and citizen volunteers to survey 161 lakes and ponds, engaging 90 volunteers to inventory, map, and control hundreds of terrestrial plant sites Park-wide; refining best management practices for terrestrial invasive plants; developing educational materials to increase public awareness and a website www.adkinvasives.com to facilitate information exchange; and in 2004 and 2005, reaching over 8,000 individuals through presentations. Invasive species management is most effective when addressed at the landscape level with the synergy of diverse partnerships. APIPP has successfully incorporated this strategy by utilizing the strengths of each Partner, organizing hundreds of volunteers and approaching this daunting issue in a comprehensive, systematic and cooperative manner that has produced real on-the-ground results.

Implementing Best Development Practices for Vernal Pools in Four New England Towns

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We implemented town-wide vernal pool inventories in four New England towns to test the methods proposed by Calhoun and Klemens (2002) for implementing voluntary Best Development Practices for vernal pools. Potential vernal pools were remotely identified using aerial photography. Fifty-two citizen-scientists surveyed 382 potential vernal pools and the adjacent terrestrial habitat. Two hundred and sixty-two (69%) of the 382 surveyed potential pools were confirmed as vernal pools. A rating system based on pool use by breeding amphibians and quality of adjacent terrestrial habitat was used to rank the town's pool resources from high to low conservation priority. Data from each pool were entered into a Geographic Information System (GIS) database and delivered to each town. All four towns have begun to propose and develop conservation plans and apply conservation mechanisms to protect high priority vernal pools. Citizen scientists profiles were analyzed using questionnaires to create a profile of successful volunteers, determine what motivated volunteers to participate, and establish what effect the project had on their community involvement. Eighty-four percent of the volunteers were between the ages of 40 and 69 years and most are involved in other community activities. These 4 case studies illustrate that vernal pool conservation initiatives can be developed in local communities using citizen scientists.

Monitoring Pesticide Effects in Wading Birds in Eastern US

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Wildlife populations are increasingly confronted with chemical contaminants. The release of synthetic chemicals by industry, agriculture, and other activities has increased by 20% over the past two decades; nearly 74,000 chemicals are in commercial use. There is increasing evidence of acute and/or lethal exposure of wildlife to toxic chemicals in the environment. Although difficult to document, sub-lethal exposure of animals to chemicals is also of concern. Intensive monitoring of herons and egrets has revealed multiple pathologies (including dermatological lesions, behavioral dysfunction, and reduced reproductive success) linked to water quality loss across a range of urban, suburban and rural estuaries. Because anthropogenic contaminants have become ubiquitous in the environment and influence the ecology of wild species, wildlife managers and scientists are increasingly required to consider chemical disturbances as an essential component of habitat. A cooperative monitoring project begun in 1995 to investigate spatial distribution of pesticide exposure and effects has facilitated ecotoxicological monitoring of important wading bird populations (including herons, egrets, ibises, storks) in eastern US. The project disseminates standardized methodological information and relevant scientific information to researchers and managers. The monitoring network, comprised of cooperating researchers and managers, will contribute ecotoxicological information to an on-line database. Analyses to date show that low-level exposure in birds to current-use pesticides is widespread and resulting in sub-lethal and lethal impacts.

Multi-scale Habitat Characteristics of Wood Frogs and Spotted Salamanders across an Urbanization Gradient

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Biologists are increasingly concerned with the impact of residential sprawl on species biodiversity. Pond-breeding amphibian populations are particularly vulnerable because of their metapopulation structure and complex life cycles. We conducted research in western Rhode Island, which is heavily fragmented by roads and residential development. Wood frogs (*Rana sylvatica*) and spotted salamanders (*Ambystoma maculatum*) oviposit egg masses that can be rapidly surveyed, providing an index of their annual breeding effort. During 2000 and 2001, we assessed the effect of within-pond habitat characteristics and landscape composition within six spatial scales adjacent to the breeding pond; 0–30 m, 0–00 m, 0–200 m, 0–500 m, 0–1000 m, and landscape patch on wood frog and spotted salamander breeding effort. Our models showed that populations of both species were affected by a combination of within-pond habitats and landscape-level habitats. Wood frog populations were positively influenced by the availability of suitable breeding ponds, and the availability forested wetlands and forest uplands within 1 km of breeding ponds, while spotted salamander populations were positively influenced by within-pond habitat characteristics and forested uplands in habitat patches around breeding ponds, and negatively influenced the available acreage of developed lands in habitat patches around breeding ponds. Only areas in western Rhode Island that have low road densities are likely to have large wood frog and spotted salamander populations. Effective conservation of amphibian species, including wood frogs and spotted salamanders, that are currently considered widespread and ubiquitous, must begin before environmental thresholds are exceeded and populations decline to unsustainable levels.

Red-backed Salamander Distribution in an Urban Park in Northern Manhattan

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Salamanders have been used in studies as indicator species to help researchers understand changes in the environment resulting from forestry practices, road building, and warming conditions. Salamander populations in urban habitats face additional pressures due to the oftentimes, uncontrolled spread of invasive species. We studied the relationship of terrestrial salamander abundance and population size structure to a set of variables characterizing herbaceous and overstory vegetation in an urban park in New York City. The study site was a mature hardwood forest on the rocky slopes of the Hudson River in northern Manhattan. Arrays of 15–20 Davis coverboards were placed in five different locations in restored (invasive plant species removed) and unrestored (invasive plant species not removed) areas of Inwood Hill Park. Over the course of two seasons, red-backed salamander (*Plethodon cinereus*) snout-vent length (svl) and total length (tl) were recorded as well as information on several habitat variables including forest vegetation, native and non-native species, and light intensity. Results show that mean svl was affected by black locust (*Robinia psuedo-acadia*), species richness and total number of trees, and light intensity. High numbers of these factors can all be attributes of a degraded habitat. Black locust was the most common non-native tree species recorded and light intensity was greatest where it was present. The large numbers of non-native tree species contribute to both the high species richness and total number of trees. Further investigation is needed, however it may be possible that smaller salamanders were forced into these marginal areas through intraspecific competition.

Hudson River Tidal Marsh Communities—The Last Millennium of Change

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A suite of tidal marsh paleoecological investigations from the Hudson River and adjacent Hackensack drainage yields a view of dramatic botanical shifts in plant communities over the last thousand years. A S–N transect of sites from Jamaica Bay Wildlife Refuge and Staten Island northward to Piermont, Croton, Iona Island reveal the timing of their origin and subsequent development over time. While pollen, spores, charcoal and % loss-on-ignition document shifts in the uplands due to droughts prior to European impact, the fossil seeds of local marsh species indicate major shifts in local plant marsh composition. Diverse sedge communities have given way to invasive Typha and Phragmites-dominated marshes today in brackish marshes, while coastal Jamaica Bay and Staten Island retain Spartina dominance. The pollen and charcoal record of drought is paralleled in Piermont marsh by the increase in inorganic silt in the sediments, suggesting that decreased rainfall produced more runoff and erosion of the upland soils. In Jamaica Bay and Staten Island marshes, a drop in inorganic input to the marshes correlates with the timing of European impact, suggesting that tributary dams resulted in major hydrological impacts to the estuary. The changes in salinity and turbidity in the estuary would have had major implications for the food chain.

New York Natural Heritage Program Survey of Southern New York State for the Long-tailed salamander (*Eurycea longicauda*)

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A field survey of extant and potential sites for the long-tailed salamander (*Eurycea Longicauda*) was conducted between July 1 and September 5, 2005 in Steuben, Chemung, Schuyler, Tioga, Sullivan and Orange Counties of New York. Sixty-four sites were visited resulting in observations at 18 sites of 68 individuals of all age classes. Seven of the sites were known from previous visits and 11 were new. Sites varied in area from 0.1 acre to over 130 acres. Speculative population forecasts at these sites varied by site from a few dozen to a few thousand. Observed population densities were as high as 9 per square meter. Two distinct habitats were occupied; rocky calcareous waterfall plunge pools at the base of major valleys and silty calcareous floodplain forest on valley bottoms. The only common habitat element was calcareous breeding pools. All sites were at base elevation of major valleys. No acid uplands or organic mucks were occupied, although many were searched. Red-backed salamanders were almost never found at occupied sites; slimy salamanders usually were. High millipede populations, often of spectacular species, were another indicator of occupied sites. Threats were few, but included heavy adjacent road traffic and park development. The long-tailed salamander appears secure in New York State in at least three meta-populations, although restricted to very specific and uncommon habitats in a limited geographic range.

Funding Habitat Conservation Projects for Species at Risk in Maryland

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As development pressure increases and intensifies along the Eastern seaboard and throughout the nation, one of the best tools in conserving our natural resources are various programs that offer funds for on the grounds habitat conservation work. The ability to identify viable sources for conservation projects is pivotal in bridging the gap between the valuable natural history work being conducted on our species at risk and the conservation projects aimed at protecting their habitats. In Maryland, funding sources such as the Landowner Incentive Program, the Forest Legacy Enhancement Program, and USDA's Wildlife Habitat Incentive Program are all valuable tools in this effort. These programs are working to protect and restore various habitats including: wetlands for Bog Turtles and amphibians, grasslands for song birds, riparian corridors for aquatic species, and caves for rare invertebrates and bats.

Predicting Rich Mesic Forests on Massachusetts State Wildlife Lands

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Rich Mesic Forest (RMF) in Massachusetts is characterized by a diverse canopy of northern hardwoods dominated by *Acer saccharum*, high species richness, abundant spring ephemerals and associated rare plants in a moist, nutrient rich environment of limited geographic extent. To enhance understanding of biodiversity on state wildlife lands and to improve protection of RMF, we reviewed known occurrences of RMF in Massachusetts, then predicted, field checked, and delineated new occurrences of this natural community type. A coarse-filter GIS predictive model was developed using slope, aspect, and profile curvature. This GIS model had limited success due to the complex signatures of Rich Mesic Forests. A second analysis was conducted using known characteristic rare plant occurrences, bedrock lithology, and USGS topographic maps. Predicted sites from both models were analyzed using color ortho-rectified aerial photos, wetland data, and forest cover types, resulting in identification of 100 potential RMF polygons ranging from <1 to 755 acres in the Western and Connecticut River Valley districts. Field verification occurred from May through July of 2005, when 60 potential polygons were visited. Ecologists evaluated the plant communities throughout each polygon for Rich Mesic Forest qualities. Quantitative community characterization data were collected within actual Rich Mesic Forest and the extent of each new community occurrence was delineated. Twenty-two of 60 polygons (37%) contained Rich Mesic Forest ranging from <1 up to 73 acres in size. These new occurrences totaled 154 acres and more than doubled the acreage of known Rich Mesic Forest on state wildlife lands.

Bronx River Ichthyofaunal Zonation, as Viewed through a Parsimony Algorithm's Lens

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The ichthyofauna of the Bronx River, a classic urban stream, has been sampled since 2001 yielding a database of just under 4,000 recorded fish. Collection sites included both the freshwater and estuarine sections of the river and geographically covered the 20 mile extent of the river from its source (Davis Brook, Valhalla, NY) to its mouth between Clason and Hunt's Points at its confluence with the East River. This area was divided into 12 shore-based sampling stations (7 freshwater, 1 freshwater but tidally influenced, and 4 estuarine) and the dredged Federal Channel which was sampled by trawl from buoy markers 5 and 6 north to Lafayette Avenue. Using techniques modified from cladistics and historical biogeography, in which the stations are treated as if they are taxa and the presence or absence of fish species are treated as characters of these stations, a resulting data matrix, consisting of 13 stations and 45 fish species, was constructed and analyzed using a parsimony algorithm (WinClada running over NONA). A null station was then added to root the analysis. The analysis yielded one tree (consistency index 70, retention index 68). Examination of this tree topology clearly shows the relationships of the fish species to each other and their zonation along the length of the river. In addition, various sections of the river, as represented by the stations and their fish communities, clustered as nested clades parsing the relationships of the stations to each other. Application of this technique permits precise stipulation of such relationships.

Collembola of New York: What Do We Really Know?

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Often biodiversity surveys are composed of the counts of birds, mammals, fish, and reptiles; i.e. the megafauna. Sometimes, these surveys include arthropods and then the larger animals like crabs, lobster, crayfish, beetles and the popular butterflies. Similarly for plants, landscapes are usually defined by the trees and shrubs present, while ephemerals, grasses, and sedges are often excluded. So what is really known about the smaller animals? Only three states have had a comprehensive survey of springtails and New York is one of those. Maynard (1951) documented 200 species and forms, but more than 50% have only one or two records from a single county and most have been recorded from less than ten five counties. Additionally these records would point to Monroe County as the center of springtail biodiversity in New York. But is it? This review of the literature will summarize our understanding of this group in for New York and determine where future work should concentrate.

Assessing the Role of New York State Parks in Preserving Biodiversity

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Rare species and significant natural communities and assemblages (collectively known as "rare elements") were recently surveyed in 135 NY State Parks by the NYS Natural Heritage Program (NHP). We examined the resulting database with the aim of characterizing these parks as a preserve system and as components of a larger conservation network. Individual parks vary widely in their habitat diversity, connectivity to other protected lands, and their surroundings. As a result, although larger parks tend to hold higher numbers of rare elements, the many small parks make unique contributions to the system's overall biodiversity. By virtue of their substantial geographic spread and unique habitat features, these parks as a system contain approximately 1/7 of all records in the current NHP database, and 30% of all federally listed populations in the state, despite occupying < 1% NY State. However, most rare elements are found in few (1-3) parks, most occupy small areas (<10 ha), and many of those with ranges carrying beyond park boundaries extend into private lands. Preliminary viability estimates indicate that about half of all recorded populations and communities face size constraints or other challenges. Further study will reveal how rare elements in state parks compare to the rest of the NHP records in their dispersion, diversity, and estimated viability.

Biological Impacts of Low Density Subdivision in the Adirondack Park

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The Adirondack Park is a relatively undeveloped six million acre area which consists of a mix of private and state owned land. The state land within the park is constitutionally protected and preserved as "forever wild forest land" and the privately owned land is subject to land use regulations administered by the Adirondack Park Agency. The Adirondack Park Agency Act came about in part as a response to proposals for large-scale subdivisions and residential development in remote, open-space areas devoted to forestry and recreation. That development pressure continues and has increased in recent years. Agency staff and WCS biologists have identified a need for a process to assess the biological impacts of low density exurban development. The potential effects on wildlife of low density exurban development have been identified but most research has been done in the Rocky Mountains and is not directly applicable to the Adirondacks. We provide an example of a Geographic Information System (GIS) – based framework to assess exurban development on a regional scale and identify broad research goals that need to be accomplished to refine and apply the model.

Epiphytic Lichen Community Response to Forest Management on *Acer saccharum* in the Adirondack Mountains of New York

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We sampled epiphytic lichen communities on *Acer saccharum* in the Adirondack Mountains of New York with the objective of understanding how lichen communities respond to silvicultural management strategies. Three management histories were considered: old growth, reserve shelterwood, and selection system, all of which included retention of several large trees. A total

of 81 *Acer saccharum* trees were sampled intensively in nine stands using arborist techniques to access canopies. 52 macro-lichen taxa were sampled. Lichen community composition and total cover on *Acer saccharum* overall did not differ between stand types. Small (>15 cm dbh), medium (>35 cm dbh), and large (>55 cm dbh) *Acer saccharum* trees differed in average percent area covered by lichen and in community composition, particularly in the canopies. Height was also important in determining species composition accounting for 21% of the variation in NMS ordination scores on one axis and 48% on another. Indicator species for large tree boles included *Lobaria quercizans* and *Ramalina intermedia*, however most indicators for large trees were canopy species such as *Platismatia glauca, Cetrelia olivetorum, Usnea* spp. and others. Nitrophilous species in the genera *Physcia, Phaeophyscia* and *Melanelia* were indicative of small trees both on boles and canopies.

"Finding Wright's Westbury"

Rosenbaum, Peter A. and Andrew P. **Nelson** (Department of Biological Science, SUNY-Oswego, Oswego, NY 13126)*

In three papers published between 1918–1919, famed Cornell University herpetologist Albert Hazen Wright described his capture of a rare bog turtle on August 13, 1916 at Westbury near Oswego, apparently in Wayne County New York while in the company of two soon to be eminent biologists and scholars. In his *Notes on the Muhlenberg's Turtle*, Wright (1918a) states that "At Westbury, N.Y. (west of Oswego, N.Y.) Messrs. F.P. Metcalf, Ludlow Griscom and myself took a specimen (carapace about 6 cm. long) in an open moor-like area on August 13, 1916." *Notes on Clemmys* (1918b) and *Turtles and Lizards of Monroe and Wayne Counties, New York* (1919), provides similar accounts. Biologists with the NYS Department of Environmental Conservation, the Fish and Wildlife Service and us could not determine site specific information on where Wright and spent this day in August of 1916. Testament to the site's indeterminate location can be found in David E. Collins's confidential field report (1989) to the DEC on his surveys of western and central NY bog turtle sites which states that "one site (Westbury) could not be located". After considerable research and field work, we captured a live bog turtle from a fen in Wayne County in the town of Westbury in June of 2004, roughly 88 years after Wright and his eminent companions made there only known visit to this site. This talk will rehearse the steps and mis-steps associated with what we believe to be the re-discovery of Wright's long lost Westbury site.

Recent Trends in New York State Nesting Shorebirds

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New York State monitors 5 species of nesting shorebirds on an annual basis through the Long Island Colonial Waterbird and Piping Plover Survey Program. This survey program gathers data annually from all known breeding locations on Long Island and New York City. This talk summarizes the current status and distribution of these species and provides an assessment of populations trends over the past eight years. Piping Plover have increased by over 50%, with Roseate Terns also showing a slight average increase. Least and Common Tern show no trend in population size. Black Skimmers show a decline of roughly 20% over the same time period.

Evidence for Spruce Grouse Decline in Boreal Peatlands of the Adirondack Mountains

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Historically occupied spruce grouse (*Falcipennis canadensis*) sites were surveyed in New York State over the period of 2002–2005 for the presence or absence of individuals. Evidence of grouse was observed at 14 sites surveyed including 13 of 30 sites visited from 1976–1987 and one additional site that had not been surveyed prior to 2000. Survey results indicate a decline in occupied sites since previous surveys conducted in 1976 and 1987. Approximately 50 spruce grouse were radio tagged throughout the duration of this study and movements between sites were small (<2 km) and made only through available habitat. Habitat analysis of 10 sites historically and currently occupied by spruce grouse revealed that persistently occupied sites contained trees that were younger, shorter and had smaller diameters at breast height than extirpated sites. Persistent sites had more live foliar coverage in the 0.2–4.0 m stratum than extirpated sites, and more blueberry (*Vaccinium* spp.) cover in the herb and shrub cover classes. Extirpated sites had more balsam fir (*Abies balsamea*) in shrub cover class than persistent sites. In addition, ericaceous vegetation in the shrub cover class was greater, saplings were shorter and sapling density was greater in persistent versus extirpated sites. Habitat data appears to suggest successional changes in forest structure and species composition that may lead to the eventual extirpation of spruce grouse in New York.

Nuisance Mammal Survey of Gateway National Recreation Area, New York and New Jersey

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While many native mammal species of Gateway National Recreation Area (GNRA) are declining, some other species, both native and introduced, are increasing such that they are becoming a nuisance to visitors and staff and a threat to rare and listed native wildlife. Walking surveys and mark-recapture trapping are being used to determine presence/absence of these species and estimate their population numbers. Also, a year-round diet study of foxes (*Vulpes vulpes*), raccoons (*Procyon lotor*), Norway rats (*Rattus norvegicus*), and feral cats (*Felis catus*) will be conducted to determine their impacts on rare wildlife. To determine specific items in their diets, rat and raccoon stomach contents and fecal samples of fox and cat will be examined. Surveys so far have indicated that different species are problems in areas within the units. No unexpected species have yet to be discovered. Evidence of fox and raccoon predating on terrapin (*Malaclemys terrapin*) nests has been observed during the late summer and fall, while in the late fall and winter, mast makes up the majority of their diets. Each individual that is trapped will be PIT-tagged for future identification. The goals of this project are to estimate the population sizes of nuisance mammals, determine their impacts on rare or threatened wildlife, and make management suggestions where necessary.

Boston Harbor Islands All Taxa Biodiversity Inventory

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The Boston Harbor Islands All Taxa Biodiversity Inventory (ATBI) is a collaborative effort to combine scientific research and public education in an island setting both "wild" and accessible to a large urban community. Primary objectives of the ATBI are to: (1) catalog the insect fauna across the Boston Harbor Islands national park area; (2) engage, educate, and excite the public about biodiversity on a very local scale through outreach and educational activities; and (3) use biodiversity data to inform park resource management. We are conducting surveys on a sub-set of the 34 islands which represent a range in island size, isolation, dominant plant communities, and human and natural disturbance. Although many of the Boston Harbor Islands are currently managed for low-impact recreational activities and wildlife habitat, they have borne centuries of direct human impacts, resulting in a dominance of disturbed habitats and non-native plant species. It is currently unknown to what extent these impacts have influenced the insect fauna. A comprehensive catalog of insect diversity, including identification of rare or invasive species, will be useful for directing management strategies on the islands, and will also provide a baseline of information for future monitoring efforts as the islands return to a more natural and native condition. Other products of this project will include a publicly accessible database of collected specimens (including images of all species), posters portraying invertebrate biodiversity for local schools, and a public exhibit of insect biodiversity on the Boston Harbor Islands at the Harvard Museum of Natural History.

Findings of the New York State Invasive Species Task Force

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The Invasive Species Task Force was created by statute in 2003. The 17-member team comprised representatives from government, conservation organizations, industry and academia. The Task Force completed its report to the Governor and Legislature on schedule, 30 November 2005. The Task Force reported on: the nature and extent of existing and potential problems; existing efforts, by government and non-government organizations; and recommendations. The 12 Recommendations in their *Final Report* called for: a permanent coordinating body; a comprehensive management plan; allocation of appropriate resources; education and outreach; information management; and research, among others. In State Fiscal Year 2005–06, the Department was appropriated 1 million dollars for the eradication of aquatic invasive species. This is being used to support a competitive grants program. Local governments and not-for-profits can apply for projects that eradicate invasive plants or animals in aquatic or wetland systems. The proposed budget for State Fiscal Year 2006–07 would provide 2 million dollars from the Environmental Protection Fund for the implementation of the ISTF Report Recommendations. Some will be used to expand grants programs. The Department has not yet decided how to use the full amount.

Discovery of a Parthenogenetic Clam Shrimp in New York and New Jersey

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We report new records of the clam shrimp, *Caenestheriella gynecia* Mattox 1950, from two localities in the Hudson Valley of New York and one locality in northeastern New Jersey. All of our specimens were collected in puddles on dirt roads. The New Jersey specimens have meristics that are well within the range of *Caenestheriella*; however, the New York specimens resemble those reported from Massachusetts with meristics that are closer to *Cyzicus*. We hypothesize that *C. gynecia* was established as a parthenogenetic species due to an unlikely dispersal event in the western part of its range and has migrated eastward since the last glacial maximum. Dispersal of this species may occur by wind, in the gut of birds, or stuck to animal feet or fur, or to vehicles. We recommend that *C. gynecia* be treated as rare and vulnerable to extinction throughout its range unless demonstrated otherwise.

Distribution and Abundance of the American Eel in a Hudson River Tributary

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American eel (*Anguilla rostrata*) was studied in the Saw Kill, a Hudson River tributary in Annandale, Dutchess County, New York. Recruitment of young American eel seems to be decreasing over the past several years. However there is a very high density of American eel in the nontidal tributary mouth (>13,000 eels/ha) and very few other fishes. Barriers substantially decrease the density of eels, approximately an order of magnitude per barrier. Small ponds are not good eel habitat and densities in those areas were comparatively low or zero. Given the overall decline in American eel populations in North America, efforts should be made to counteract falling recruitment. In the Saw Kill, we could increase the number of mature female silver eels by erecting passage facilities on the barriers.

Upland Freshwater Fishes in the Hudson Highlands

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The upland freshwater fish fauna of the Hudson Highlands was initially determined by the ability of fishes to colonize the area after glacial recession. Few fishes were able to colonize the area and most were very tolerant of environmental conditions. Several species are still at their northernmost limit in this area. With colonization, more species were added by human intervention, a process that continues today. Dispersal also continues as shown by the recent movements and ultimately hybridization between the two species of *Umbra* in the Hudson Valley. This paper is a summary of the current Hudson Highlands fish fauna and a description of their origins.

Update on the Status and Distribution of Short-eared Owls in New York State

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Earlier analyses of short-eared owl (*Asio flammeus*) wintering sites in New York State showed that from 1980 to 2002, only 32 wintering areas supported at least five birds for a minimum 5 years. Nearly half of these sites reached their maximum occupancy before 1980. This study uses new data from the winters of 2003-2006 to update the status and distribution of wintering short-eared owls in New York State. Site visits to eight wintering areas during the winter of 2003-2004 identified shared habitat characteristic, including small streams, and farmland mosaics of old fields, pastures, mowed grasslands, corn, and row crops. Several wintering areas included active horse farms. When the locations of wintering sites reported by birders throughout the winter were compared to those recorded during Audubon Christmas Bird Counts, the correspondence was poor, suggesting that neither technique provides a reliable way of monitoring the number of short-eared owls wintering in the state. Breeding season information, updated with new data from the second New York State Breeding Bird Atlas, shows that this species has continued to decline as a breeder. Most recent breeding has been limited to the St. Lawrence and Lake Champlain Valleys and the Great Lakes plains. Records from the marshes of Long Island's south shore are few. Radio or satellite telemetry data are needed to better understand the seasonal movements of this New York State endangered species.

Science on the Fly! Loon Migration: Linking People and the Environment

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In 2005, the Adirondack Cooperative Loon Program (ACLP) introduced "*Science on the Fly! Loon Migration*: *Linking People and the Environment,*" an innovative middle-school curriculum. This new curriculum builds upon research conducted by the ACLP and the U.S. Geological Survey (USGS) that uses satellite telemetry techniques to identify areas in eastern North America important to common loon (*Gavia immer*) populations for migration and wintering habitats. Scientific inquiry learned through "*Science on the Fly!"* promotes student centered, open-ended explorations into the dynamics of freshwater aquatic environments. By connecting classroom activities and investigations to the ACLP-USGS's loon migration research, students gain an understanding of the ecological links between people, the environment, and its wild inhabitants. The Teacher's Manual provides guidance to educators to utilize the unique training video, classroom activities, and interactive website, www.scienceonthefly.org, to teach students how to design and conduct their own scientific studies. Initially piloted in Adirondack middle school classes during the winter of 2004–2005, *Science on the Fly!* is now available to students and educators worldwide via ACLP's website, www.adkscience.org/loons. ACLP's education programs bring the results of its research to the public, increasing awareness of the connections between habitats utilized by wildlife year-round, and resulting in a better understanding of how conservation concerns in one area affect a wildlife species throughout its range. This knowledge enables students and the general public to make informed decisions about their use of environmental resources and better appreciate how people affect the environment and its wild inhabitants on local, regional, and national scales.

Long-term Assessment of Mercury through Sampling of Loons, Fish, Water, and Sediment

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The Adirondack Cooperative Loon Program, a partnership of the Wildlife Conservation Society, Natural History Museum of the Adirondacks, NYS Department of Environmental Conservation, BioDiversity Research Institute, and the Audubon Society of New York, is using the common loon (*Gavia immer*) as an indicator species to assess the mercury exposure and risk in aquatic ecosystems in the Adirondack Park of New York State. As part of a long-term study examining loon survival and reproductive success in relation to mercury, abiotic (water and sediment) and biotic (loon, prey fish, crayfish, and zooplankton) samples were collected from 44 lakes in the Park from 2003–2004. Mercury analysis of these samples was used to develop a mercury exposure profile to evaluate the ecological risk that mercury deposition poses to Adirondack waterbodies and loon populations. Ecological risk was quantitatively assessed using a formula for a wildlife criterion value to determine if the water column mercury concentration is protective of wildlife at the population level in the Adirondack Park. The differences in reproductive success and survival in common loons in relation to their mercury exposure were used to develop a mercury hazard profile. A population model was also developed to determine if mercury contamination is affecting the population growth rate of loons in the Adirondacks. Results of this project will enable researchers, regulatory agencies, and policy makers in New York State to make informed decisions regarding regulation of airborne pollutants and management of wildlife species and freshwater ecosystems.

Durand-Eastman Park Arboretum: The Unknown, Forgotten, Ignored Arboretum

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The Durand-Eastman Park Arboretum lies on the shore of Lake Ontario in Monroe County, NY. It was established on 484 acres of abandoned farm land by Dr. Henry Durand and George Eastman in 1909 and has since grown to over 1000 acres. Bernard Slavin was assigned the task of establishing the arboretum. By 1925 Slavin and his crew had planted over 140,000

deciduous trees and 7000 conifers. Over 500,000 trees and shrubs had been planted by the 1940s. Images of specimens from the arboretum will be shown together with species lists from various areas of the park in order to demonstrate the horticultural diversity of the area. The arboretum is a treasure in western New York and deserves to see greater use by academics and students alike.

The Zooplankton Community Index as a Tool for Measuring Zooplankton Recovery in Chemically Recovering, Acidified, Adirondack Lakes

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We examined 30 lakes in the Adirondacks, ranging in pH from 4.5 to 7.1 in 1994, for evidence of chemical and biologic recovery during the 10-year period concluding in 2003. We looked for indicator species (defined) that could reliably predict biotic recovery and could find none. Instead, rotifer and crustacean species were assembled into 3 groups, acid sensitive (>pH 5.6), acid resistant (pH 5.0–5.6) and acid tolerant (<pH 5.0). As lakes acidify, acid sensitive species drop out of the community early in the process and acid resistant species become progressively less abundant while acid tolerant species progressively dominate as acidification becomes extreme. We used abundance of species relative to pH to produce a community index (defined) for crustaceans, rotifers and combined zooplankton to quantify changes in relative abundance that should accompany biotic recovery, i.e. a decline in acid tolerant species, increase in acid resistant species and the return of acid sensitive species. We used regression analysis to assess changes in the community indices for each of the 30 lakes for the 10-year period. We compare biological indices of lakes showing chemical recovery with those that do not and identify those lakes showing the greatest rate of recovery. The zooplankton community composition index is a promising tool for the evaluation of zooplankton recovery over the entire pH spectrum found in acidified lakes and should have broad application in acidification studies.

Comparison of Zooplankton Community Dynamics in Brooktrout Lake; 1987 and 2005; Is This Acidification Recovery?

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In the 1980s Brooktrout Lake was the poster child of highly acidic clear water lakes. I studied the zooplankton (crustacean, rotifer and insect) dynamics in the open water months of 1987 and 2005. The zooplankton community was typical of acidic clear water, fishless lakes of the Adirondacks. A large population of phantom midges, *Chaoborus americanus,* shaped seasonal dynamics of the community. The rotifer community was dominated throughout our sampling period by *Keratella taurocephala,* the most common dominant of acidic lakes. The crustacean community was primarily made up of copepods, *Mesocyclops edax* and *Leptodiaptomus minutus*. Cladocera were virtually absent although daphnid ephippia were common in the lake sediments. Population abundance peaked in the late summer to early fall. The 2005 zooplankton community was more diverse and more abundant. Phantom midges continued as the dominant planktonic predator and the same rotifers and crustaceans were the primary dominants for the year. In the spring *Collotheca mutabilis,* was the dominate planktonic rotifer and *Polyarthra vulgaris*, *Synchaeta sp., and Ploesoma truncatum* were significant components of the rotifer community at times during the summer and fall. *M. edax* was the dominant crustacean, developing large populations in the deeper waters (>10m). The small cladoceran, *Bosmina longirostris,* was common in the spring and summer. Over the past decade, since the CAAA went into effect, the chemistry of Brooktrout Lake suggests it has changed from a highly acidic clear water lake to a productive, mildly acidic lake. The zooplankton community also appears to have changed significantly. These changes will be evaluated in the context of our knowledge of zooplankton community structure and variability in lakes across the Adirondacks.

Bird Conservation in New York State—Are We Meeting the Challenge?

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Recently, a prominent scientist observed that science is not about opinion; science is about skepticism. Modern conservation must be based upon the best science available, not just upon opinions, expert or otherwise, no matter how passionately those opinions might be held. This conclusion invites important questions such as, “What is science?” or “What is science-based conservation?”. This presentation will explore those questions, in the context of adaptive ecosystem management, offering guidelines for identifying and evaluating science-based approaches to conservation of migratory birds. Important components of science-based conservation include repeatability of methods, iterative peer-review, and formal acknowledgment of the work of others, all predicated upon the honesty, integrity, and objectivity of those who practice scientific discovery as a basis for

conservation. In this talk, information gathered over the past 40 years about breeding bird populations will be used to evaluate progress toward conservation of New York's bird species of greatest conservation concern. It is very probable that more than 80% of those bird species identified as endangered, threatened, or special concern in 1985 are either no better off, or are worse off now than they were twenty years ago. This observation raises important questions about the abilities of agencies to conserve migratory bird resources, as well as the extent to which nongovernmental organizations are measurably successful as advocates for effective bird conservation.

Invasive Plants on the Adirondack Forest Preserve: The State of Our Knowledge

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In 2004 and 2005 Adirondack Nature Conservancy/Adirondack Park Invasive Plant Program staff and Student Conservation Association AmeriCorps Environmental Steward staff undertook a systematic effort to identify and quantify the extent of terrestrial invasive species on Forest Preserve Units in the Adirondack Park. Staff documented the following invasive plants: garlic mustard (*Alliaria petiolata*), Japanese knotweed (*Fallopia japonica* ssp. *japonica*), common reed (*Phragmites australis* ssp. *australis*), purple loosestrife (*Lythrum salicaria*), Japanese barberry (*Berberis thunbergii*), black locust (*Robinia pseudoacacia*), shrub or oriental and hybrid honeysuckles (*Lonicera* spp.), Canada and/or bull thistle (*Cirsium arvense*, C. *vulgare*) and wild parsnip (*Pastinaca sativa*). There are 47 State land units in the Park occupying approximately 2.7 million acres (1.1 million hectares). The 2005 survey indicated that there are 2.84 acres (1.15 hectares) affected by invasive species on Forest Preserve land. The data indicate that invasives are at very low population levels, and reminds us that prevention and Early Detection/Rapid Response are key ingredients to protecting the natural systems on State lands. Of the 28 DEC Forest Preserve Campgrounds the survey team visited, 16 had minor to severe infestations of terrestrial invasive plants. The most common problem species was garlic mustard, followed by Japanese knotweed, purple loosestrife and honeysuckle. The inventory provides a preliminary indication that 12 NYS DEC Campgrounds appear to be free of terrestrial invasive plant species.19 campgrounds and day-use areas have not been inventoried.

Early Holocene Reforestation of Mountain Slopes of the Northeast

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The percent organic matter, pollen, and plant macrofossils records of sediments from two ponds in Maine, Surplus (640m) and Speck (1060m), provide a record of the reforestation of the mountain slopes in northwestern Maine and the development of the White Pine, Hemlock, Northern Hardwood Forest. Close interval sampling of well-dated sediments (16 AMS radiocarbon dates at each site) allow the precise timing of changes in the forest composition. Beginning 11,500 calendar years ago widely-spaced populations of first spruce then poplar, alder, fir, and paper birch trees expanded on the tree-less slopes. At least on the lower slopes forests dominated by white pine and oak replaced this early open forest by 9500 years ago. Low frequencies of hemlock, sugar maple, and possibly beech trees grew in more sheltered sites and above their modern elevational limits during this time. The 8200 year-event (8390 years ago) marked the beginning of the 1400-year transition from pine/oak to white pine, hemlock northern hardwoods forests. This transition ended 7000 years ago with the final major expansion of hemlock, beech and yellow birch populations to their modern abundance at elevations of up to 1000 m.

Effects of Lakeshore Development on Common Loon Reproductive Success

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The common loon (*Gavia immer*) is a management species of special concern in New York State. Historical records indicate that the southern border of the loon's breeding range is slowly moving northward, suggesting that loons are finding less suitable habitat than once existed in New York State. A possible explanation for this trend is the loss of nesting habitat resulting from

increased lakeshore development. A field study was conducted during the 2004 and 2005 breeding seasons to quantify lakeshore development on a sample of 54 lakes in the Adirondack State Park. Loon productivity data for these lakes over the last 6 years (2000–2005) was then used to examine the relationship between lakeshore development and loon productivity. GIS analysis of Adirondack Park Agency land classification within buffered areas of study lakes was also used to predict maximum allowable levels of development in traditional loon nesting areas. Results indicate that current levels of shoreline development have not had a negative impact on the nesting success of loons in the Adirondacks. Analysis of 2005 nest site data, however, illustrate a positive correlation between hatching success and nest distance from nearest development unit.

The Hudson Highlands: A Refuge for the Threatened Timber Rattlesnake (*Crotalus horridus*)

***Stechert**[*,1], Randy and James **Beemer**[2] ([1]Timber Rattlesnake Consultant, Narrowsburg, NY 12764; [2]United States Military Academy, West Point, NY)*

Habitat loss from rapidly expanding rural development in Southeastern New York continues to adversely impact timber rattlesnake colonies in this core area of their state range. In the Hudson Highlands, state park lands and the adjacent West Point Military Reservation and Black Rock Forest comprise more than 96,000 acres of relatively contiguous forested ridges and valleys. These protected lands contrast sharply with the adjacent privately owned forested tracts currently undergoing or are proposed for extensive residential development. Rattlesnake colonies that are associated with overwintering dens located $\geq$ 1 km within protected land boundaries often share genetic diversity with neighboring colonies, and appear to be maintaining stable numbers despite incidental attrition from hikers, illegal snake hunting, and road mortality. Rattlesnake colonies with dens located < 1 km of the protected land boundaries are at a greater risk from peripheral development. In some of these areas public education programs and "nuisance" rattlesnake relocation volunteers are having definable success with the result that the rattlesnakes are living longer, growing larger, and reaching their maximum size and reproductive potential.

Feral Cat Colonies and State Parks: Challenges, Stakeholders and Control Options

***Stein**[*], Amanda J. and Thomas B. **Lyons** (New York State Office of Parks, Recreation and Historic Preservation, Environmental Management Bureau, Empire State Plaza, Albany, NY 12238)*

On a statewide basis feral cats do not appear to pose a significant problem at New York State Parks. In a few parks, however, feral cats do represent a significant concern with respect to potential impacts on patrons, staff, and wildlife. In 2002, a survey was distributed to State Park managers in an effort to identify the extent of feral cat presence at park facilities. Of the 97 park managers that responded, 48 identified at least one feral cat in their park. Colonies of 10 or more cats were present at 8 parks. With this information, guidelines were developed by the agency to address feral cat control in State Parks. With continued concern over potential human health risks, threats to native wildlife, and the plight of feral cats, a meeting was convened in March 2006 to further address feral cat colonies at Long Island State Parks. The meeting involved a variety of stakeholders including government agencies, non-profit organizations, and concerned individuals. The purpose of the meeting was twofold: 1) to gain a better understanding of the perspectives of others and 2) to collaboratively identify strategies for bringing the feral cat colonies into better conformance with the agency's guidelines of feral cat control in state parks. We will report on the results of the survey of park managers, the agency guidelines, stakeholder input, and insights into the challenges and benefits of this collaborative effort.

The Oldest Trees

***Stein**[*,1], William E., Frank **Mannolini**[2], Linda Van Aller **Hernick**[2], Ed **Landing**[2], and Christopher **Berry**[3] ([1]Department of Biological Sciences, Binghamton University, NY 13902-6000; [2]Research and Collections, New York State Museum, Albany NY 12230; [3]School of Earth, Ocean and Planetary Sciences, Cardiff University, Cardiff CF10 3YE, UK)*

A general pattern of increasing size, shoot complexity, and diversification of terrestrial plants is well-documented in Silurian–Devonian sediments worldwide. Much less well understood is the basic body plan in divergent major groups of plants, and how these plant architectures contributed to the structuring of early terrestrial ecosystems. Reported here are major new discoveries from South Mountain, Schoharie County, NY (lower Upper Devonian) of mostly complete tree-sized plants—rare as fossils in any age. The new specimens for the first time link well-known Middle–Upper Devonian *Pseudosporochnus* (Cladoxylopsida) previously known from branch systems, heretofore thought to have been borne on a stout main stem, with a main trunk and base similar to those originally described by Winifred Goldring of the NYSM from the Schoharie Valley region. The new specimens reveal a very tall palm-like plant with a bulbous base anchored by many thin roots. The trunk tapers gently and suggests at least limited secondary growth. The intact crown shows an attached system of mostly planate *Pseudosporochnus*

branches borne in regular orthostichies. Branches showing bifurcations, characteristic speckled cortex, and fertile ultimate appendages, probably developed on, and abscised from, the trunk as frond-like units. These specimens now provide the first concrete example of a tree-form cladoxylopsid that, despite its antiquity and significantly more primitive form, is nevertheless immediately recognizable as a basic body form among living plants. These fossils provide a unique glimpse into the earliest known forests—stands of shallowly rooted tall trees with a much branched but leafless canopy.

Long-term Decline (and Recovery?) of Native Bivalves in the Hudson River

Strayer, David L. and Heather M. **Malcom** (Institute of Ecosystem Studies, Millbrook, NY 12545)*

Conservationists fear that the invasion of the zebra mussel (*Dreissena polymorpha*) from Europe in 1985 may lead to the extinction of many populations and species of native North American bivalves. The invasion of the Hudson River estuary by zebra mussels was followed by steep declines (77 to >99.7%) in populations of all species of native bivalves between 1992 and 1999. Body condition of all unionids, and growth and recruitment of young unionids also declined significantly. Declines in population size and body condition were correlated primarily with the filtration rate of the zebra mussel population, not with fouling of native bivalves by zebra mussels. Samples taken since 2000, however, have shown that populations of all four common native bivalves have stabilized or even recovered, although the zebra mussel population has not declined. The mechanisms underlying this apparent reversal of fortune are not clear: recruitment and growth of young mussels have showed limited recovery, but body condition of adults has not. We found no evidence that spatial refuges contributed to this reversal of population declines. Simple statistical models project now that native bivalves may persist at population densities about an order of magnitude below their pre-invasion densities. These results offer a slender hope that long-term coexistence of zebra mussels and native bivalves may be possible at some sites.

What Plants did Mastodons Eat?

Teale[,1], Chelsea and Norton G. **Miller**[2] ([1]Department of Geography, Syracuse University, Syracuse, NY 13210; [2]New York State Museum, Albany, NY 12230-0001)*

Fossil mastodon (*Mammut americanum*) excavations sometimes reveal deposits of twigs and other plant fragments identified as gastrointestinal contents or fecal debris, but possibly representing instead fossils in the matrix surrounding the bones. Fossil plant assemblages found in undisputed examples of mastodon digesta can be used as direct evidence of diet, as well as plant distributions at the time of mastodon death. Macrofossil and palynological analyses of a dispersed dung deposit in western New York (Hiscock Site, 45°05'04"N, 78°04'57"W) and of molar socket content from the Hudson Valley (near Hyde Park, 40°46'45"N, 78°04'57"W) were used to determine the botanical composition of late Pleistocene mastodon food. Pollen and plant macrofossils from the samples indicate the presence of white spruce (*Picea glauca*), tamarack (*Larix laricina*), balsam fir (*Abies balsamea*), jack pine (*Pinus banskiana*), and balsam poplar (*Populus balsamifera*), which were members of the post-tundra conifer paleoforest. Modern assemblages of plant material from boreal, treed, calcareous fens (modern analogs of sites where mastodons died) differ in preservation characteristics and are therefore taphonomically informative. Relatively high concentrations of *Picea* at both paleontological sites indicate spruce dominance, preferential browsing, or differential digestion. High herb pollen counts—in contrast to minimal macrofossil evidence of herb abundance—may reflect browsing behavior and differential preservation after ingestion. Very high alder (*Alnus*) pollen in the molar socket (80%, versus 15% in the surrounding sediment matrix) establishes that alders had been browsed by the Hyde Park mastodon before its death. Similarities between the fossil plant assemblages suggest that *Picea, Larix, Pinus* and herbs were commonly consumed by mastodons and not as isolated local, seasonal, or starvation food.

Updated Floras of Two Counties in Central New York: Montgomery and Otsego

Tedesco, Connie, Donna W. **Vogler**, and Adam K. **Ryburn** (Biology Department, State University of New York, College at Oneonta, Oneonta, NY 13820)*

As part of a previous study, ten counties in New York State were identified as having listed floras likely to under represent the actual biodiversity of that county. Here we report on Phase I: fieldwork conducted during the summer of 2005 to upgrade collections from two neighboring counties in the Leatherstocking region of NY. The flora of Montgomery Co., previously listed as having only 269 species of vascular plants, now has over 700 species. The flora of Otsego Co., initially listed with 488 species, now has close to 900 species. Both revised totals now reflect the average number of species of neighboring counties listed in the NY Flora Atlas. Sets of vouchers will be deposited in the State Museum and a county herbarium. Areas of high local diversity were identified for regular collections, on both private and public lands. While this work did not specifically focus on rarity,

areas with unusual ecosystems were identified and visited including: cedar swamps, bogs, fens, limestone karsts, gorges, and falls. Extensive populations of several rare species were visited including Jacob's ladder (*Polemonium van-bruntiae*), Golden Club (*Orontium aquaticum*), and Podgrass (*Scheuchzeria palustris*).

Glass, Birds, Science and the Observation Tower at Niagara Falls State Park

Terbush, Karen B. and Thomas B. **Lyons** (New York State Office of Parks, Recreation and Historic Preservation, Environmental Management Bureau, Albany, NY 12238)*

Niagara Falls State Park, established in1883, is the oldest state park in the United States and attracts millions of visitors every year. It is also located within the Niagara River Corridor Important Bird Area. The Niagara River is especially important for its winter populations of gulls (19 species) and waterfowl. The habitats adjacent to the river serve as important stopover areas for migratory songbirds during both the spring and fall migrations and the IBA supports a great diversity of breeding birds as well. The observation tower was constructed in 1961 to provide views of the falls and access to the base of the falls. Studies in the late 1990s determined a need to make improvements to the Tower to increase capacity for visitors. This paper discusses how the environmental review process under SEQR, public comments and science influenced the final design for renovation of the observation tower to help protect birds. Specific design recommendations will be outlined. The Draft Environmental Impact Statement called for cladding the tower in reflective mirrored glass to reduce the visual impacts. During the comment period, several concerns were raised about the potential for the reflective glass to result in bird collisions with the tower. Using research from the scientific literature (Klem, 1989, 1990, 1991) Parks staff were able to work closely with the design architect to develop glass specifications that would prevent bird collisions. Scientific research (Ogden, 1996; and Fatal Light Awareness website) also resulted in reduction of light impacts to migratory birds.

Vernal Carbon Translocation from Senescing to New Fronds in *Dryopteris intermedia*

Tessier, Jack T. (Biology Department, Central Connecticut State University, New Britain, CT 06053)*

Dryopteris intermedia is a wintergreen fern, replacing its over-wintering leaves with a new set in spring. My previous work documented positive net vernal photosynthesis in this species. In this project, I labeled old fronds with $^{13}CO_2$ to determine if this spring-fixed carbon moves from the old fronds as they senesce to the rest of the plant. There was significant movement of carbon from the old fronds to the new fronds one month after application of the label and non-significant movement of carbon to the rhizome and fine roots. These results indicate that one benefit of the wintergreen phenological strategy is to provide new growth with a carbon source early in the growing season. Future work will seek to document movement of fall-fixed carbon from old fronds to the rest of the plant and examine other wintergreen fern species for their potential to make use of the vernal photosynthetic period to boost early spring growth.

The Submersed Macrophyte *Utricularia inflata*: A Nuisance Invader or Critically Imperiled?

Titus, John E. and Rebecca A. **Urban** (Department of Biological Sciences, Binghamton University, Binghamton NY 13902)*

We began finding the submersed freshwater macrophyte *Utricularia inflata* (inflated bladderwort) in 1999 in Adirondack Mountain lakes, some 300 km distant from the closest previously reported occurrence. Our objectives for this study were (1) to assess the potential for this rootless plant to thrive in new sites on the basis of its ability to grow on a variety of lake sediments and (2) to document the apparent spread of *U. inflata*. We carried out field and greenhouse experiments to test the effects of a wide range of organic, silty, and sandy natural lake sediments on *U. inflata* growth. Sediment type had no significant effect in either field or greenhouse environments. A slight but significant ($P<0.001$) effect of pH on relative growth rate (12% higher at pH 5 than at pH 7) supported the contention that water chemistry may be a more important determinant of growth rate for this species than sediment traits. Sampling with SCUBA revealed the presence of *U. inflata* in eight lakes, all within the Black River (Limekiln Lake and First, Second, Third, and Seventh Lakes in the Fulton Chain) and Raquette River (Raquette, Long, and Tupper Lakes) drainage systems of the Adirondacks. It can be locally abundant, more indicative of a nuisance invader than a critically imperiled species. At high densities, *Utricularia inflata* may have considerable ecological impact on biodiversity and ecosystem function.

Movements of Adult, Metamorphic, and Translocated Metamorphic Tiger Salamanders on Long Island

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Understanding the characteristics of ponds and vernal pools utilized by amphibians, as well as the upland habitats used throughout the year, is essential to the conservation and proper management of these species. The long-term survival of the New York State endangered Eastern Tiger Salamander (*Ambystoma tigrinum tigrinum*) is of special concern due to rapid development of its last remaining habitats on Long Island. A radio-telemetric study is currently underway at the Brookhaven National Laboratory on Long Island, New York. Data were collected from 2004 to 2006 at four pond locations. Twenty-three adults and thirty-three metamorphs have thus far been captured and implanted with transmitters. Adult animals spent an average of 47 days and metamorphs 23 days in burrows between surface movements. Single night movements ranged from 7 to 237m for adults and from 4 to 269m for metamorphs. Implanted animals have been lost due to predation, loss of transmitter signal, or are still being tracked. Ten of the metamorphs were translocated 1500m from one breeding pond to another, but none survived beyond 93 days. Single night movements for these metamorphs ranged from 5 to 289m, with individuals moving in random directions from the release point. Based on our findings, we feel that the current 100-foot buffer zone for wetlands and aquatic breeding habitats and the corridors to maintain connections with adjacent areas beyond 500 feet are insufficient to maintain breeding populations of Tiger salamanders in NYS, nor does it appear that metamorphs can be successfully transplanted as a management technique.

The Human Footprint in the Northern Appalachian/Acadian Ecoregion

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The Northern Appalachian/Acadian ecoregion covers portions of four U.S. states (New York, Vermont, New Hampshire, and Maine) and four Canadian provinces (Quebec, New Brunswick, Nova Scotia, and PEI). It has one of the longest histories of post-Columbian human development in North America, which has had a profound effect not only on the natural history of the region but also on the prospects for conservation in the 21st century. To understand the magnitude and distribution of human transformation in the region, my colleagues at the Wildlife Conservation Society and the Nature Conservancy and I developed a spatially explicit map of its human footprint. We used region-specific datasets at a high resolution (90 × 90 m) to reveal not only the remaining "wild" landscapes and potential ecological linkages within the area, but also to identify potential low-cost opportunities and priorities for conservation action. The data sets used to assess the human footprint include measures of human settlement (both population and dwelling density), land use/land cover, transportation networks, electrical power lines, and dams. Human footprint scores are then calculated by summing the scores across all the data sets and normalizing the total between 0 and 100. I will discuss the patterns observed in the human footprint map, including identification of the areas under the greatest stress and analysis of how the human footprint corresponds to the region's existing network of protected areas.

Adult *Ladona deplanata* Partition Habitat by Sex and Reproductive Maturity

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Ladona deplanata (Rambur) is an early spring dragonfly with synchronized emergence and a short flight season. *L. deplanata* is most common in southern and eastern coastal states; however, it has smaller scattered populations inward to the central US. This study investigated habitat partitioning at a fishpond in southwestern Ohio, at the northern edge of its inland range. Locations of individuals were recorded during weekly walks of modified Pollard transects along established trails. Habitat was significantly partitioned by sex and reproductive maturity. Reproductively mature males were routinely recorded in open sunny areas both near and far from the pond. Reproductively mature females and prereproductive individuals of both sexes were mostly recorded in shaded areas or in a scattered juniper wood (*Juniperus virginiana*) which contained invasive Amur honeysuckle (*Lonicera maackii*). Reproductive females were only recorded at the pond when ovipositing.

Shading by an Invasive Macrophyte Affects Native Isoetid Growth and Sediment Chemistry

Urban, Rebecca A., John E. **Titus**, and Wei-xing **Zhu** (Department of Biological Sciences, Binghamton University, Binghamton, NY 13902)*

The submersed macrophyte *Utricularia inflata* (inflated bladderwort) is a recent invader of Adirondack Mountain lakes (NY, USA). Previous experiments suggest that *U. inflata* may change nutrient cycling in Adirondack lake ecosystems by reducing the growth of native isoetid macrophytes, and consequently altering key features of sediment chemistry. A 13-week greenhouse experiment was conducted to test the hypothesis that shading is the primary mechanism behind this rootless macrophyte's detrimental impact on the native short-statured species, *Eriocaulon aquaticum* (pipewort). *Eriocaulon aquaticum* has an extensive root system that takes up carbon dioxide from sediment, and releases oxygen into sediment creating an oxidized environment. As we increased shading by adding layers of shade cloth (1–4 layers), growth and asexual reproduction by the native species significantly declined ($p<0.001$), as did its effect on sediment chemistry. Shading decreased *E. aquaticum*'s oxidizing effect on the sediment ($p<0.0001$) and increased the concentrations of porewater carbon dioxide ($p<0.0001$) and extractable ammonium ($p<0.0014$). There was on average an 83 % light attenuation under a cover of *U. inflata*, and this value was close to the light attenuation from two-layers of shade cloth (82 %). The impact of *U. inflata* on the native species closely matched the impact of two-layers of shade cloth. Our results suggest that the primary mechanism behind *U. inflata*'s impact on native isoetids is due to shading.

Bog Turtle (*Clemmys muhlenbergii*) Habitat Use in Two Contrasting Wetland Landscapes

Utter, James, Jamie **Balleau**, Michael **Echevarria**, Beverly **Leon**, Cheryl **Ryder**, and Walter **Soto** (Environmental Science Program, Purchase College, SUNY, Purchase, NY 10577)*

Two small populations (N= 4–5) of bog turtles in New York's Great Swamp (Putnam and Dutchess Counties) have been monitored for the past six years to assess population status and habitat use. The populations are 20 km apart and occupy contrasting landscapes: one is dominated by shallow sedge marsh and forested swamp, the other is based on an extensive tussock sedge-sweet flag-purple loosestrife marsh. A small area of rich sloping fen and bands of tall shrubs are the only habitat types they have in common. Animals located by visual search or trapping were radio-tagged and monitored until fall. During the six year period, one population has been static and the other nearly so; although nesting has been seen in each population, no hatchling or juvenile animals have been found. Habitat use varied among individuals, landscapes, and years, with the amount of summer precipitation having significant effects overall. Home ranges overlapped extensively, but some individuals displayed site fidelity to a specific area that others did not use. A location where surface water or saturated muck persisted during summer droughts appeared to be a critical habitat feature that individuals moved into during these periods. Hibernacula habitat differs between the two sites, but specific overwintering locations tend to be traditional for each individual. Habitat management recommendations are to increase open canopy sedge fen nesting habitat and create clearings in the swamp forest where surface water persists throughout the summer.

Winter Habits of Porcupines (*Erethizon dorsatum*), Helderberg Plateau, Albany County, New York

Ver Straeten, Charles A. (New York State Museum, The State Education Department, Albany, NY 12230)*

The North American porcupine is adapted to winter survival on poor quality diets in the Northeastern United States. I observed the habits of porcupines during winter 2004–05 in a 3 km^2 area of mixed deciduous-conifer forests of the Helderberg Plateau. Thirteen individuals were found over the winter (density 4.3/km^2), located by extensive daytime search of the forest for visual sightings and sign (e.g., trackways in recent snow, nipped twigs, other feeding sign, scat). Individual animals were not marked; approximately weekly search and observation indicated that porcupines utilized distinctive areas, where they largely remained for the winter. This allowed for recognition of individuals. Nine porcupines were visibly observed living in hemlocks throughout the winter; 5 animals lived underground in rock dens (4) and under tree roots (1). Another lived part-time in a hollow tree base, part-time in hemlocks. The presence or absence of denning animals was indicated by fresh sign, or occasional sightings. Animals in dens moved short to long distances (ca. 3 m to >150 m) between resting and feeding areas. Tree-living individuals generally rested and fed in the same tree, or a few local trees. One animal, observed nearly weekly over 4.5 months, lived and fed in 6 trees, positioned along contour on a 90 meter-long linear trend. All porcupines fed primarily on hemlock. Some supplemented that diet with white pine (4 animals), or deciduous bark (sugar maple, 3 animals; beech, 2 animals). One animal lived and fed in 2 adjacent hemlocks until they were nearly fully defoliated.

The Native Flora and Fauna of Some Farms in Columbia County, NY

***Vispo**, Conrad and Claudia **Knab-Vispo** (Farmscape Ecology Program, Hawthorne Valley Farm, Ghent, NY 12075)*

Columbia County, like many of the surrounding counties, has a long agricultural history. Farming probably reached maximum extent during the last half of the 19th century when over three quarters of the land was in farms. This was accompanied by extensive opening of the landscape. Subsequently, reforestation occurred, and forest plants and wildlife benefited from this. However, the grasslands and shrublands created by our relatively small-scale agriculture provide important habitats to native, non-woodland species. For many of these species, original natural habitats (such as prairie and wetland) have declined markedly at the continental level. Most recently, Columbia County has experienced high development pressure. Based on initial results, we conclude that, at least for certain groups of organisms (e.g., the plants and butterflies of wet and brushy meadows, an array of grassland and shrubland birds, certain vernal pool amphibians), Columbia County farms can provide useful habitat and that these habitats may be threatened by land use trends in the County.

The New York Flora Atlas: More than a Distribution Atlas

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In June 2005, the revised New York Flora Atlas (http://atlas.nyflora.org) was unveiled. This revised atlas is based on the Florida Plant Atlas (http://plantatlas.usf.edu/) which allows for dynamic interaction between the atlas database and the publicly-accessed website. For each taxon, specimen information, nomenclatural details, ecological preferences, and other data are entered into a Microsoft SQL Server database. Web pages are generated directly from this database using ASP program language. We soon expect to update the atlas website to a .NET platform with XHTML coding. This will allow for multiple improvements including advanced download options and greater search tools. As most users are aware, there are a number of taxonomic differences between Mitchell's 1997 and 2000 New York Plant Checklists and the Atlas. With new versions of Flora of North America appearing, updates to Kartesz' Biota project, regional floristic studies in New England and the southeastern US, and ongoing taxonomic research, there is a significant amount of new information that relates to the New York flora. The New York Flora Project aims to keep abreast of all recent botanical research and where appropriate apply plant name changes to the Atlas. Those studying the New York flora are encouraged to adopt the names used by the Atlas. The Atlas has a detailed synonym list so all names are easily retrieved and point to the current "accepted" name. This talk will focus on the technology used to build the Atlas, forthcoming improvements, and the rationale behind the taxonomy followed.

Marsh Breeding Bird Survey in the Hudson River Estuary

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During 1986–87, the New York State Department of Environmental Conservation (NYSDEC) and the Hudson River Foundation jointly sponsored a study of avian breeding habitats in six tidal marshes on the Hudson River—West Flats, Stockport Marsh, Hudson North Bay, Tivoli North Bay, Constitution Marsh, and Iona Marsh. In recent years, documented changes in the Iona Marsh vegetation coupled with anecdotal reports of marked changes in the avian community renewed interest in repeating this study. In 2004–2005, four of the marshes were resurveyed. Point counts in 2004–2005 indicated significantly lower avian diversity and increased evenness at Iona Marsh than observed in 1986–1987 and at the three upriver marshes. The shift in Iona community composition results from an increase in Red-winged Blackbird and decline in marsh resident species: American Bittern, Least Bittern, Virginia Rail, Marsh Wren, and Swamp Sparrow. The lowest concentration of nests was found at Iona Marsh where nearly all nests were Red-winged Blackbird. At the three upriver marshes, Marsh Wren, Virginia Rail, Least Bittern, American Goldfinch, Swamp Sparrow, American Robin, Gray Catbird and Willow Flycatcher nests were found in addition to those of Red-winged Blackbird. At Iona Marsh, vegetation was dominated by Common Reed while the upriver marshes were dominated by Narrowleaf Cattail. Statistical analyses indicated a strong negative association between Common Reed and the numbers of Marsh Wren, Red-winged Blackbird, Swamp Sparrow, and Virginia Rail. The impairment of the Iona Marsh avian community appears related to a recent (mid 1990s) shift from cattail to Common Reed.

Paying Close Attention in the Field: Lessons from *Carex* Section *Acrocystis*

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Carex nigromarginata (section *Acrocystis*) was rediscovered in NY in the Hudson Highlands in 2002. After this rediscovery, numerous populations were encountered at various sites throughout the Highlands. Due in part to past confusion in the literature regarding the "basal spikes" of *C. nigromarginata* and members of section *Acrocystis,* I began investigating the entire section with hopes of clarifying the use of basal spikes for identification purposes. This led to the discovery of an undescribed species of *Carex* (*C*. sp. nov.) in section *Acrocystis* (formal description has been submitted for publication) which, along with *C. nigromarginata,* near their northern limit in southeastern NY. In the past, *Carex* sp. nov. has mostly been misidentified as either *C. umbellata* or *C. nigromarginata*. *Carex umbellata* misidentifications appear to be the result of misunderstanding the concept of basal spikes or fast determinations. The two are easily separated by presence (*C. umbellata*) or absence (*C*. sp. nov.) of basal spikes. *Carex nigromarginata* misidentifications are perhaps the result of collectors viewing *C*. sp. nov. as part of the variability of *C. nigromarginata*. Key differences are leaf width and culm height (*C. nigromarginata* has wider leaves and taller culms). In the core of the range of these two species, they are common and often grow together making the discovery that the two are distinct more difficult. The realization that *C*. sp. nov. was indeed different was facilitated by its occurrence adjacent to *C. nigromarginata* in the Highlands where the two are rare and only occur as tiny populations.

Breeding Populations of Double-crested Cormorants on the Upper St. Lawrence River, 1991–2005

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After a decades-long hiatus, Double-crested Cormorants (DCCOs) resumed nesting on the upper St. Lawrence River (USLR) in 1991 near Cornwall, Ontario. By 2005, their nesting on the USLR included over 2997 nests on 17 active colonies; colony size ranged from 13 to 559 nests. Approximately 87% of nests and 82% of colonies were located in Canadian waters; 13 % of nests and 18% of colonies were located in US waters. The average annual growth rate from 1991 to 2005 was 48.3%; however, the annual growth rate over each of the last two years was only 11.2 and 5.9%. The distribution of nesting sites covered the length of the upper St. Lawrence River from Kingston to Lake St. Francis. Vegetation on the cormorant nesting islands in the SLR has not been quantitatively assessed however, on some islands, e.g. Dickerson, Murphy and McNare Islands, it has noticeably thinned. On McNare Island, a grove of large white pines has died. Large post-breeding roosting aggregations of cormorants, away from their nesting sites, e.g. Salmon Island (eastern Lake Ontario) have not been investigated on the USLR. Cormorants are known to usurp heron nests and all known heron colonies on the USLR (5) have DCCOs nesting in them; herons may at risk of nest takeovers by cormorants. Particularly disturbing, is the loss of 60+ breeding pairs of Great Egrets from Dickerson Island, possibly due in part to nest competition with DCCO and the appearance of raccoons on the island, first recorded in 2004.

Population Status of NY's Endemic Chittenango Ovate Amber Snail

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The fourth year of a mark release recapture study of the endangered Chittenango ovate amber snail (COAS) (*Novisuccinea chittenangoensis* Pilsbry) was conducted at Chittenango Falls State Park, New York over a twenty-two week period between May and September of 2005. This study was a continuation of the work begun in 2002 with the objective of developing and testing a survey protocol for estimating the COAS population. Changes in protocol were made throughout the study to minimize effort, minimize negative impact on habitat, and maintain strength of the population estimate. Results from the first two years were significantly different from the last two years with regard to capture rates and estimated population size although the population peaked at the same time each year. A new tagging procedure in 2003 allowed for an evaluation of growth rate and movement of individual animals. There was no indication that marking techniques used in any year affected snail survival. In 2005 COAS were found to occupy an area of 70 square meters, a considerable increase over the initial known area of utilization.

Nest Site Choice and Nest Temperatures in Diamondback Terrapins

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Nest site choice was studied in diamondback terrapins (*Malaclemys terrapin)* at the Jamaica Bay Wildlife Refuge in Queens, New York. Temperature loggers were placed in 136 nests, and then the nests were protected from predators and monitored for hatching. Nest site microhabitat characteristics (overhead cover, percent bare ground, litter, grass and cactus) were recorded for each nest. Random nest sites were also generated and the same nest characteristics were recorded for these sites. Nest temperatures were used to predict the outcome of the hatchlings sex ratio. Nest characteristics were compared to the average nest temperature using a principle components analysis to determine which nest characteristics were most important to nest temperature. Random nest sites were also compared to real nest sites in an attempt to determine which physical characteristics females are using in their nest site choice.

Ecology of Box Turtles in Central Massachusetts

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In 2005 we initiated a four year telemetry study in the Connecticut Valley in Massachusetts to examine the ecology of eastern box turtles (*Terrapene carolina*) near the northeastern limit of the species' range. Fifty-six individuals at four distinct sites were located 2 to 3 times per week during the active season (May-October). Total straight line movement distance ranged from 135 to 1600 meters (median=455, n=54 adults). Turtles utilized open areas such as residential yards, abandoned gravel pits, and powerlines in spring and early summer for foraging and nesting, and deciduous and pine-oak forests for over-wintering. Nests were deposited from June 6 to July 6, and nest sites were limited to anthropogenic disturbed areas. Four nests were deposited in a 2.0 acre artificial nesting area created next to a newly constructed industrial park. Clutch size ranged from 3 to 10 eggs (mean=5.8, n=19). Nests were protected and egg viability was 49%. Straight carapace length, movement distance, and clutch size are generally larger than reported throughout the rest of subspecies' range, consistent with latitudinal size increases observed in some related species. We will continue to monitor these turtles for three additional years, and draft a conservation management plan for the species in Massachusetts.

Nutrients and Trophic Status of Star Lake in the Northwestern Adirondack Park

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The hamlet of Star Lake has a vested interest in the trophic status of the lake as it depends on it as a source for its municipal water supply. The private ownership of the shoreline (7.40 km) requires this kettle lake to exert strict control of nutrient addition. The lake was stratified in during the summers of 2001–2005 with winter stratification shown in winters 2003 and 2005. Metalimnetic oxygen maxima were observed in summer 2004 and 2005 with low levels of oxygen in the hypolimnion. Alkalinity (10 mg/L calcium carbonate) and hardness (as 15 mg/L calcium carbonate) values reflect the contribution of groundwater through adjacent calcareous sands. Chloride levels measured in summer 2004 were 8 mg/L, higher than samples taken by the ALSC in 1985. Historically Star Lake has had good water clarity (Secchi depths of 4–7 m) and low amounts of phytoplankton. Phosphorus levels measured in winter 2003 and 2005 showed extremely low levels (< 5 ppb) indicating an oligotrophic state. In situ bottle studies (October 2003, and summers 2004 and 2005) with additions of phosphorus and nitrogen showed a significant increase ($p < 0.05$) in chlorophyll a levels over controls. Further experiments in summer 2004, 2005 confirmed phytoplankton response to added nutrients (N and P), but only if N was added. The development of an anoxic hypolimnion each summer and immediate response to added nitrogen and phosphorus indicates the sensitivity of Star Lake to changes in trophic status.

Herpetofauna Road Crossing Structures—Informing Design through Behavioral Analysis

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Seasonal movements are fundamental to the life cycles of many species of amphibians and reptiles. These patterns of migration are often compromised by the presence of roads. Roads negatively impact many amphibian and reptile populations in various ways, such as obstructing movement, fragmenting and degrading habitats and causing increased mortality through vehicular

contact. Road crossing structures provide one possible way to mitigate the negative effects of roads and facilitate safe passage for these species. However, if crossing structures are to be effective, animals must be willing to use them. Through a series of behavioral choice experiments, we examined whether certain aspects of structural design might influence animal preferences for particular crossing structures. Using individuals from four species, Northern green frogs (*Rana clamitans*), Leopard frogs (*Rana pipiens)*, Painted turtles (*Chrysemys picta*), and Snapping turtles (*Chelydra serpentina*), we tested four qualities of possible under-road crossing structures, aperture size, substrate material, length, and light availability. Our analysis of the results indicates that particular variables, such as aperture size and substrate material, did influence patterns of choice. These studies have elucidated important design aspects for the creation of behaviorally palatable crossing structures.

Natural History of Sterling Forest State Park

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Sterling Forest State Park, a recently saved portion of the NY–NJ Highlands region in Orange County, New York, has much natural history to offer. Its nearly 20,000 acres include a variety of habitats from thin soiled ridge-tops to wooded mountainsides, lakes, streams, wetlands, fields, and even a sand quarry, the result of the last ice age. In the past ten years there have been many natural history surveys of Sterling Forest State Park conducted by the Natural Heritage Trust and others. For example at least 1,100 plant species, nearly 100 species of breeding birds, 84 different butterflies and several hundreds of moth species have been identified. Sterling Forest is host to perhaps the largest population of Timber Rattlesnakes in the State, and equally good numbers of worm and hog-nosed snakes, two highly specialized species, can be found. Herp species are well represented and a growing number of mammal species are reliably reported. Located within 50 minutes of the George Washington Bridge, this state park provides an impressive array of ecosystems easily explored by natural history enthusiasts.

Inventory and Assessment of Invasive Plant Species in the Catskill Mountains

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The distribution of invasive plant species has not been well documented in the Catskill Mountains in southeastern New York. To assess the threat of 12 invasive plants to forest and aquatic ecosystems, we established 172 randomly placed half kilometer belt transects along road sides and trails in the 136,000 acre Beaverkill forest matrix block. The roads and trails in and surrounding the block were stratified into nine habitat types based on road size, adjacent land use, and block location using National Land Cover Data and Tiger road data in Arc View GIS 3.3. Within the half kilometer belt transects, the presence/absence of the twelve invasive plants was recorded in twenty 50m subplots, 10m from the road edge. Of the 12 focal invasive plant species, *Celastrus orbiculatus* was the only species not detected. Sixty eight percent of transects contained at least one invasive species. *Alliaria petiolata* and *Lonicera* spp. were the most abundant species, found in approximately half of the transects. Additionally, *Rosa multiflora* and *Berberis thunbergii* were found in moderate frequencies at 31.3% and 25% respectively. Using forward stepwise multiple regression, it was determined that invasive species richness and abundance were best explained by the distance to the closest developed area, followed by road type and distance to the closest agricultural field >10 acres. This study will be used to develop control strategies to rapidly respond to the high priority invasive plant species to mitigate their effects on forest and aquatic ecosystems in the Beaverkill Forest Matrix Block.

Can Atlas Data Be Used to Monitor Avian Population Change?

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Ecological processes, such as extinction and invasion, are often the culmination of years and decades of population change. Consequently, long-term population monitoring represents an essential component of conservation. Agencies involved in monitoring often collect distributional data, however, little is known about whether these data accurately reflect changes in regional abundance. New York is the first state to have completed two statewide Breeding Bird Atlases. Our objective was to determine if distributional changes are correlated with changes in relative abundance using two independent data sets: the Breeding Bird Atlas (BBA) and the Breeding Birds Survey (BBS). The BBA is a comprehensive, state-wide survey documenting the distribution of breeding birds in New York. The 1980 BBA was conducted between 1980-1985 and the 2000 BBA was conducted between 2000–2005. Over the same time period, the BBS has collected bird abundance data on 198 roadside routes randomly distributed throughout the state. For 110 species, we found that there is a positive interspecific relationship between statewide abundance

and distribution in the two independent sampling periods of 1980–1985 ($r^2 = 0.59$, $p < 0.001$) and 2000-2005 ($r^2 = 0.52$, $p < 0.001$). For those species demonstrating significant changes in abundance (N = 68), we found that distributional changes were highly correlated, in both direction and magnitude, with changes in state-wide abundance ($r^2 = 0.86$, $p < 0.001$). These findings suggest that, at a regional level, changes in Atlas data accurately reflect changes in relative abundance, and that distributional surveys offer a powerful tool for measuring population change.

Abstracts for Poster Presentations

Phytoremediation: An Alternative Technology for Contaminant Clean Up

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Phytoremediation is the direct use of living green plants for in situ risk reduction of contaminated soil, sludge, sediments and groundwater through contaminant removal, degradation, or containment. Pollution with metals and xenobiotics is a global problem and the development of financially viable clean up technologies is vital. Phytoremediation technology is based on specific plants' abilities to breakdown or degrade organic pollutants, or to contain and stabilize metal contaminants. The United States Environmental Protection Agency, for example, is one agency that as been researching this technique to remediate toxic sites and has found it to be most useful at sites with shallow, low level contamination. At this point phytoremediation technologies are available only for a small subset of pollution problems such as arsenic, mercury, lead, and a few xenobiotics. It is a passive but often a cost effective alternative to the removal of contaminated soil. Phytoremediation is an aesthetically pleasing, solar energy driven technology that is useful in remediation cases but also could be used with foresight in private and municipal landscaping as a precautionary measure.

Floral Gender Variation in Invasive Knotweeds

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Japanese Knotweed (*Fallopia japonicus*, formerally known as *Polygonum cuspidatum*), its cogener Giant Knotweed (*Fallopia sachalinense*), and their associated hybrids are invasive weeds across the Northeastern US. While clonal reproduction is the major source of spread, reproduction by seed is indicated in a few studies but largely the sexual reproductive aspects of their life history is not well known. A survey was undertaken in Fall 2005 to examine variation in floral gender in 6 populations in Otsego Co. NY, of which two were morphologically identified as *F. sachalinense*, three that appeared to be *F. japonicus*, and one that was taxonomically uncertain. Our preliminary results indicate distinct male and female plants of Japanese Knotweed, whereas Giant Knotweed appears to be largely hermaphrodites. The putative "hybrid" population contains individuals with flowers showing all possible gender types and gynodioecy. Further studies are needed to clarify the potential role of hybridization or introgression in altering reproductive functions in the invasive *Fallopia*.

Ecological Assessment of the Plant Communities of Bonita Swamp, Western New York

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Forested wetlands are important in maintaining the functions of western New York landscapes. The Chautauqua Watershed Conservancy's Bonita Swamp, although in the past subjected to intense anthropogenic disturbance, is today an undeveloped area where native wetland vegetation has reestablished. The study site is located at the southern end of Chautauqua Lake where it empties into the Chadakoin River near Jamestown, New York. The site comprises 21 hectares of hardwood swamp, shrub wetlands, marshes and other riparian habitats. In fall 2005, we began investigating the composition and environmental attributes of the wetland plant communities. Initial research focused on the location and areal extent of distinct plant communities, community composition, and documentation of the flora including collection of specimens for the SUNY-Fredonia herbarium. Field and greenhouse studies have begun to quantify the response of tree and shrub seedlings to microtopographic and microsite variability in the swamp. These studies seek to elucidate the factors that control regeneration dynamics and determine the relationship between the soil seed bank and the standing vegetation. Permanent plots will be established to determine relationships between vegetation, environmental factors, and potential threats posed by the establishment of stands of *Phragmites australis*, an aggressive non-native wetland invader, and other anthropomorphic pressures. This information will enable us to best manage this natural area and improve our understanding of northeastern forested wetlands.

Leaf Litter Quality of Adirondack Upland Streams: Managed vs. Preserve

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Leaf litter quality plays an important nutritional role in headwater streams. Since upland streams are relatively small (1st order and 2nd order streams) with a dense forest canopy, primary productivity from stream macrophytes and microphytes is hindered (Fisher and Likens 1973). This creates a dependence on the adjacent riparian zone as a primary productivity input, making upland stream ecosystems detrital based and dependent on allochthonous organic matter (Cummins and Klug 1979 and Fisher and Liken 1973). Differing riparian vegetation allocate varying nutritional value which in turn reflects the stream macro and microscopic fauna. Riparian vegetation composition can be influenced by disturbances. In this study we focused on the effects of logging on leaf litter food quality indicators. To determine if logging has an effect, three managed sites were compared to four preserved sties within the Adirondack Park. Food quality indicators such as protein, C/N ratio, ash free dry mass and hydrolysis resistant organic matter were used to compare the sites. Based on our results Preserve sites have organic matter of a higher quality for potential consumers.

Spotted Turtle (*Clemmys guttata*) Use of Mosquito Control Ditches

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Based on the results of his mark-recapture study of Spotted Turtles (*Clemmys guttata*) on eastern Long Island, John Behler of the Wildlife Conservation Society speculated that Suffolk County Vector Control's ditch maintenance practices were killing and injuring spotted turtles. In the fall of 2004, a radio telemetry study commenced to determine spotted turtles' use of mosquito-control ditches during the winter, spring, and summer seasons, to describe some of the physical and biological characteristics of those ditches used by the turtles, and to survey three other ditched wetlands in Suffolk County for spotted turtles. Fourteen spotted turtles were fitted with radio transmitters and relocated a minimum of once every ten days. A total of 524 relocations were made over the course of the study. Locations were mapped, distances traveled between relocations were measured, and vegetation and temperatures in the immediate vicinity were noted. Salinity and water level fluctuations in the study area were recorded through several tidal cycles. This study revealed a strong preference among spotted turtles for mosquito control ditches (97% of relocations during the winter, 92% during the spring, and 62% during the summer), particularly those ditches containing emergent vegetation (*Typha* spp., *Phragmites communis*, and *Scirpus americanus*). Turtles remained active throughout the winter season, moving an average of 17 meters between relocations (compared to 53 meters/relocation in spring and 38 meters/relocation in summer). One of the three ditched wetlands surveyed revealed spotted turtles. These results pose a management challenge for Suffolk County Vector Control and the NYSDEC.

Application of Genetic Techniques to Conservation of Cape Cod Diamondback Terrapins

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Two issues that must be considered in attempts to restore threatened turtle populations are the genetic diversity of the local population and the possibility of introduction of foreign or harmful microbes to wild populations. Conservation strategies that employ headstarting to reintroduce diamondback terrapins (*Malaclemys terrapin*) to locations where they have been extirpated or to relocate terrapins from healthy colonies to colonies with declining populations must take these factors into account. Modern genetic techniques make it possible to examine populations to determine the genetic variation within each terrapin cluster. We are using DNA microsatellite markers that are polymorphic in diamondback terrapins throughout their range and have focused our studies on Cape Cod terrapins. Our preliminary analysis of DNA from over 50 terrapins captured in Wellfleet, MA show little to no variation of microsatellite alleles. We are expanding this fine scale genetic mapping to other terrapin clusters on Cape Cod and southeastern Massachusetts. We are also employing an analysis of 16s ribosomal RNA genes to identify microbes that have colonized headstarted diamondback terrapins and will compare these species to bacteria found in terrapins captured in their natural habitat.

Species Richness of the Plant Genus *Carex* across New York Counties

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Carex has the greatest number of species of any genus within New York. We looked at the distribution of *Carex* in NY counties, looking for factors that influence species richness. As expected, *Carex* species richness correlated with overall species richness. However, several counties (Nassau, Suffolk, New York, Kings, and Richmond) stood out in having less *Carex* richness than would be expected given their total species richness. And several counties (Onondaga, Oneida, Dutchess, Clinton

and Yates) had greater *Carex* richness than would be expected. Several factors are probably operating. Many of the counties with low *Carex* richness are largely urban/suburban and the associated alterations in habitat may decrease *Carex* richness relative to overall richness. Additionally, and especially for Nassau and Suffolk counties, proximity to unique coastal habitats may increase overall richness while *Carex* is not a participant. The cause of high *Carex* species richness relative to overall richness is less obvious. Having unique habitats (*e.g.* bogs) where *Carex* is common is important; but these habitats bring in other species as well. And *Carex* is associated with a wide range of habitats. Species of *Carex* that are found in only one or two counties are not associated with just the 'high-*Carex'* counties. There are 15 species of *Carex* that occur only in one county; four of these occur in 'high-*Carex'* counties (three in Onondaga and one in Dutchess) but two occur in a 'low-*Carex'* county (Nassau) and the rest are in counties with neither high nor low *Carex* richness.

Developing an Awareness of Biodiversity in Intermediate School Students

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Our Nature Trails Project focuses on introducing fifth grade students to the concept of Biodiversity in the field. Through their experiences they are able to construct their own understanding of how complex and diversified life can be even in our small preserve. The program involves using a PDA (personal data assistant) with an attached GPS (global positioning system) to record and later analyze information related to the various components of the various ecosystems in our Wood Road Preserve in Ballston Spa. Cybertracker (www.cybertracker.org) makes use of technology that is commonly used by biologists in the field around the world. It was initially developed for use by the Bushmen of South Africa but has since become a widely used tool for field biologists around the world. Students have been educated in the identification of regional tree and plant species, animal tracks, and some birds. In correlation with the state and national science standards students can make observations, record their observations with the use of integrated Palm technology, transfer that data to the computer lab computers and display their data as points on a map of the area, spreadsheets, or graphs. They will then be able to analyze their data to make inferences about the Wood Road ecosystems, seasonal and annual growth patterns and ultimately changes over time. Additionally, students keep Nature Journals, create PowerPoint presentations, brochures, and participate in activities like "Animal Track Jeopardy". We have found our students and their parents to be eager and capable participants in this project.

Update on Crayfish Species in West Branch of the Delaware River

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The introduction of rusty crayfish (*Orconectes rusticus*) to New York State rivers poses a threat to crayfish diversity. Rusty crayfish are not listed as present in the Delaware River drainage basin (Daniels 2004). Using d-ring nets, four sites along the mainstem of the West Branch of the Delaware River and eight sites in tributaries were examined to determine crayfish species composition. Male and female specimen of *Cambarus bartonii*, *O. rusticus,* and *O. propinquus* were collected. Previous studies only found *C. bartonii* and *O. limosus* to be present in the drainage basin. We did not encounter any *O. limosus*, which may indicate its absence from the river system. *C. bartonii* were only found in tributary streams. *O. rusticus* were only seen in the mainstem, below Route 26 near Telford Hollow (Delhi). *O. propinquus* were found in both tributaries and the main stem, but not below Hoag's Crossing (Delhi). *O. propinquus* and *C. bartonii* were found together in one tributary site (Betty Brook). Rusty crayfish are continuing to spread throughout New York's water systems. Changes to species lists for individual river systems are expected. The ecological importance of crayfish, both native and invasive, highlights the need for more comprehensive surveys of these keystone species.

Non-vocal Begging Strategies of House Wren Nestlings

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Nestling begging behaviors can be viewed as competition between nestlings for parental food allocation. Their begging has multiple components: vocal and non-vocal. Altricial young are totally dependent on the parents for food, so influencing parental food allocation through begging is a good strategy for enhancing fitness. We are interested in non-vocal aspects of begging, such as nest position and posture that may influence who is fed. The parent's decision about who is fed may depend on these behaviors, because they may signal who is the hungriest. The offspring may also use these signals as strategies to take advantage over siblings in the nest to increase their own food intake and their own chance of survival. The non-vocal strategies for influencing food allocation may change over developmental time. The behaviors exhibited by House wren (*Troglodytes*

aedon) nestlings in a Geneseo, NY population were video recorded for one hour at three different nestling ages (early, middle, late). During the summer of 2005, these videos were watched and we recorded which nestling was fed, position in relation to the parent, who was the first to beg, and the intensity of the nestling begging. We will present results on the influence of position in the nest, begging intensity and timing of begging on parental food allocation.

Evaluating the Landuse on Surface Water Quality in Queens County, New York Using Simple Field Kits

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Community water throughout the United States are under increasing threat of contamination from agricultural and urban-use of fertilizers and pesticides. Water samples were collected and analyzed in the field from six ponds / lakes from Queens County, New York. The concentrations of dissolved oxygen, chlorine, phosphate, ammonia, and nitrate were determined. Several types of landuse around these water bodies were identified. Our analyses indicate that the increasing use of lawn fertilizers is affecting the water quality in this urban hydrologic system. Although many factors can contribute to increasing concentrations of nitrate, ammonia, and phosphate in surface water, this study showed a correlation between the concentrations and the landuse, namely, houses with lawns/garden and parks. More studies need to be done to identify the statistically significant landuse type contributing to a significant change in water quality.

Bryophyte Cliff Communities and Updating of Mosses with SH Ranking

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Bryophytes make up approximately 15% of the New York State flora; however, they are rarely included in community surveys and remain under-documented in the State. Our study combined community- and species-centered approaches to move forward on bryophyte documentation in the State. Our community work focused on cliff communities from a range of rock types in three regions of New York: Adirondacks, Catskill–Shawangunk, and Finger Lakes. Our species-centered approach placed emphasis on the 55 mosses listed as SH. Current results indicate: liverworts accounted for a significantly higher proportion of species richness at acidic ledges than at basic ledges and there was clear separation of bryophyte cliff communities along a rock type gradient. Within bryophyte groups, the ancestral, multi-layered thalloid liverwort species were restricted to calcareous ledges while the derived leafy species were predominant on acidic rock types. In the mosses, there was increasing importance of pleurocarpous species on calcareous rock types. Our collecting efforts (over 1,000 vouchers) have resulted in the collection of 23 mosses listed as rare in the State including one addition to the NY bryoflora, *Fabronia ciliaris*. We have completed herbarium searches and annotations of all the previously listed SH species, and found of the over 200 specimens 22% were incorrectly identified. In 2006, we have begun updating ranks of S1/S2 species based on literature and database information and will focus field work on locating recent sites for remaining SH species. This work contributes to a basis for bryophyte conservation efforts in the State.

Propagule Pressure and Demography of Bird-disseminated Alien Plants in Three Communities

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Much of the Northeast is in varying stages of forest succession. Forest succession is influenced by species composition during early and mid-successional stages, including the presence of invasive, alien species. Abandoned agricultural fields (old fields) and abandoned conifer plantations represent common non-climax habitats in our landscape. We examined the intensity of seed rain by alien species and demography of alien populations at four plots within these habitats, along with four white ash (*Fraxinus americanus*)–sugar maple (*Acer saccharum*) forests, representing the climax community in much of our region. Density of seed rain by alien species, notably including bush honeysuckles (*Lonicera* spp.) European buckthorn (*Rhamnus cathartica*), autumn olive (*Eleagnus umbellata*), and multiflora rose (*Rosa multiflora*), was greatest in old fields and high in plantations compared to ash-maple forests. Availability of artificial bird perches markedly increased seed rain in old fields but only marginally increased seed rain in forested habitats. Density of exotic bird-disseminated plants was much higher in old fields and plantations than ash-maple forests. The density of European buckthorn was particularly high in abandoned plantations. Light conditions, as determined by hemispherical canopy photography, were intermediate in plantations compared to old fields and ash-maple forests. Intermediate light conditions and the wide availability of mid- and low-canopy woody plants suitable for perching may provide conditions favorable for invasion of bird-disseminated alien plants into abandoned plantations.

Fat Stores and Orientation of Migratory Thrushes along Southern Lake Ontario

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Both fat stores and geographical barriers affect the orientation of migratory songbirds during migration. Fat birds will usually orient in the direction of the barrier, while lean birds often exhibit reverse orientation away from the barrier. However, most studies of this phenomenon have focused on the interaction of fat and large geographical barriers at locations far from the migrant's breeding grounds (such as along the Gulf of Mexico). The orientation of *Catharus* thrushes (Swainson's and Gray-cheeked thrushes) was examined during fall and spring migration at the Braddock Bay Bird Observatory on the south shore of Lake Ontario. Mist-netted birds were held overnight and tested in Emlen funnels to determine their orientation preferences. Each bird was accessed for stored fat and age. During fall and spring migration, fat thrushes oriented in seasonally appropriate directions (south and north, respectively). Lean birds were less oriented than fat birds, and oriented in significantly different directions than their fat conspecifics. During spring migration, lean birds exhibited reverse orientation towards directions to the south of Lake Ontario. During fall migration, lean birds oriented bimodally along the lakeshore, either towards the east or west. The results from spring migration are consistent with the orientation of birds facing a long journey across the Gulf of Mexico, but the orientation of fall migrants at Braddock Bay is not. These findings will be presented in the context of previous studies and the different pressures that migrants face during spring and fall migration.

Mapping Potential Wetlands in a GIS: Implications for Restoration and Conservation

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Using aerial photography to locate and map wetlands is a common practice, but this method only maps wetlands that exist at the time the aerial photo is taken. We use a Geographic Information System (GIS) to map and predict where wetlands *could be* ("potential wetlands") based on permanent land features: land position, elevation, slope, moisture, soil, and geology. Each location is given an Ecological Land Unit (ELU) based on its characteristics – a method modified from the Nature Conservancy. Whether an ELU is currently a wetland depends on the influence of humans and beavers, but can be verified using aerial photos or field observations. Having GIS maps of potential wetlands and current wetlands allows for many analyses. Conservation planners or wetland regulators can look at wetland area, wetland community type, spatial distribution, proximate land uses, land ownership, and changes in wetland coverage (loss or gain). This knowledge will also support decisions for wetland mitigation—a created or restored wetland is more likely to succeed if it is sited where the underlying features are supportive of a wetland. The areas used for this project are the Ausable and Boquet watersheds of the Adirondack Park, New York.

Development and Maintenance of Diversity in New York Coastal Wetlands

Distler, Matthew T. and Donald J. **Leopold** (Faculty of Environmental and Forest Biology, State University of New York College of Environmental Science and Forestry, Syracuse, NY 13210)*

Coastal wetlands of New York support many rare and state-protected plants, animals, and plant communities. Previous research on coastal wetland communities suggests that inter-annual water level fluctuations may be critical for maintaining their diversity over time and that water level regulation of Lake Ontario may jeopardize these communities. Neither the long-term stability of these communities nor the importance of complex disturbance regimes in their development is well characterized, however. Plant macrofossils from peat cores taken from two coastal Lake Ontario wetlands were analyzed, showing that these wetlands have been subject to periodic fires and breaching of sand-dunes that otherwise separate them from Lake Ontario. Diverse shrub and sedge-dominated fen communities persist for long periods once established, but certain disturbances or changes in soil-chemistry or hydrologic conditions in these wetlands may lead to long-term changes in plant community composition. Macrofossil evidence suggests that dune barrier blowouts are sometimes associated with conversions from one type of community to another. Aerial photographic analysis reveals rapid changes in wetland composition over the last 50 years, as cover of hybrid cattail (*Typha* × *glauca*) expanded concurrently with regulation of Lake Ontario water levels. Along with radiocarbon dating to determine the chronology of wetland development, further work is planned to compare the disturbance regimes and development of coastal fens to nearby inland fens, which are not affected by recent Lake Ontario regulation or the long term effects of isostatic rebound.

Proposal to Study Factors that Affect Piping Plover Hatching Success

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Low productivity because of decreased hatching success in areas with chronic human and/or predator disturbance may be a factor contributing to Piping Plover (*Charadrius melodus*) population declines and limiting recovery. Egg depredation is one factor that directly contributes to poor hatching success in this species, yet can been substantially deterred by adults with elaborate distraction displays and by land managers with nest exclosures. During distraction displays however, they may be subject to physiological changes (neuroendocrine response) and reduced egg viability. I propose 3 non-mutually exclusive hypotheses to explain why adult Piping Plovers may abandon their nest or have low hatching success: 1) human disturbance leads to decreased hatching success and/or abandonment, 2) predator disturbance leads to decreased hatching success and/or abandonment, or 3) Piping Plovers eggs that do not hatch are not viable. I anticipate identifying factors that affect the likelihood of Piping Plover nest abandonment and partial clutch failure. Nest abandonment and partial clutch failure may be a result of disturbance, a factor that land managers can control. I would like to investigate the relationships among nest disturbance, adult behavior, exclosure use, egg viability, and nesting success. These findings will aid in the recovery of this Federally and New York State Listed species. Three techniques will be used to monitor nest disturbance: infrared monitoring, direct human counts, and passive tracking. Adult behavior will be studied using focal monitoring and abandoned/un-hatched eggs will collected for viability analysis.

Bird Use of Onondaga Lake: Baseline Bird Surveys for Habitat Remediation Sites

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Although Onondaga Lake historically has been considered one of the most polluted lakes in the US, it provides important habitat for resident and migratory birds. The open water, littoral zone, and surrounding wetlands offer vital habitats that are utilized by a variety of waterfowl species. This study was designed to examine the bird species using the lake habitats following some initial habitat rehabilitation efforts. Visual surveys were conducted from 2002–2005 along the southwestern shoreline, which included an in-lake habitat module and modified lake-wetland connections. We tested for yearly and seasonal differences for number of species and total birds. Over the 4-year study, 49 species of birds were identified using the lake and habitat module, and year-to-year differences were generally not significant. Future research will be directed at combining these data with historical records and other research in efforts to provide a more complete understanding of the importance of Onondaga Lake to bird species.

Predation by Introduced Mosquitofish (*Gambusia*) on Ambystoma Salamander Larvae

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Because of concerns about mosquito-borne diseases, especially West Nile Virus, non-native fish have been introduced into small ponds throughout the Northeast as an alternative to chemical control of mosquitoes. Although negative consequences of these introductions on native species have been shown, direct effects on larvae of *Ambystoma* salamanders are not documented. We tested non-native mosquitofish (*Gambusia affinis*) and native brook stickleback (*Culaea inconstans*) for their predatory behavior toward larval *A. maculatum* in laboratory chambers. Both fish species preyed heavily on the larvae, indicating that despite their small size, *Gambusia* may kill substantial numbers of amphibian larvae. These data, when combined with previous studies indicating that *Gambusia* do little to reduce mosquito densities, indicate that the negative impacts on *Ambystoma* populations out-weigh any potential benefit of using mosquitofish to control mosquitoes and that greater efforts should be made to prevent mosquitofish introductions in New York State waters.

Integrative Ecological Interactions Limiting Molybdenum Uptake in *Lupinus perennis* and Symbiotic *Bradyrhizobium*

***Fey**[*], Samuel B. and William A. **Pfitsch** (Hamilton College, Clinton, NY 13323)*

The micronutrient molybdenum is essential for symbiotic bacterial nitrogen fixation and plant metabolism. Its availability may be limited in natural systems at soil pH, and high iron and sulfur levels. We examined the potential role of molybdenum in limiting *Lupinus perennis* expansion in the Rome Sand Plains, Rome, NY. This study documented soil nutrients with and without established lupine, and assessed whether high sulfate levels may inhibit the uptake of molybdenum by *L. perennis* and

Bradyrhizobium, and the potential for high iron concentrations and low pH values to limit the growth of *Bradyrhizobium* at different molybdenum levels. The RSP soils had undetectable levels of molybdenum, acidic pH (pH ~5), and soil in *L perennis* patches had significantly higher mean pH (P<0.0001), greater iron concentration (P=0.0243) and lower sulfur concentration (P =0.0105) than bare sand samples. A 50 day plant growth experiment revealed a marginally significant depression (P= 0.136) of *L. perennis* growth between low sulfur: high molybdenum and high sulfur: zero molybdenum treatments, suggesting that excessive sulfate may reduce molybdenum uptake and reduce lupine growth. Addition of molybdenum to bacterial culture media significantly increased *Bradyrhizobium* growth at all levels of iron and sulfur (P<0.0001, P<0.0001), but there was no evidence of competitive reduction of *Bradyrhizobium* growth at high iron or sulfur levels. *Bradyrhizobium* did not grow when its culture medium was less than pH 7 (P<0.0001). Our results indicate that soil conditions at RSP may be unfavorable for the establishment of the association between lupine and its nitrogen-fixing symbiont.

Can External Body Measurements Accurately Predict Internal Reproductive Effort?

Forrest Pinder, Rebecca A. (Biology Department, University at Albany, State University of New York, Albany, NY 12222)*

In an effort to reduce the number of animals sacrificed while conducting research, many scientists use body condition as an indication of reproductive health. The current study was part of a larger research project in which the effects of parasites and stream quality on the reproductive health of *Desmognathus ochrophaeus* were assessed using invasive necropsies as well as non-invasive, body condition measurements. Many of the internal reproductive indices (clutch/gonad mass, size of gonads) were significantly associated with external measurements such as body mass, and tail width or length; yet, these relationships were relatively weak (R-square values <0.53). Researchers should use care when making assumptions based on body condition measurements. In this study, testes mass was significantly different among sites based on the quality of the stream, however none of the external measurements were found to be significantly different among streams. The subtle effects of treatment were only visible at the invasive level. The results of this study indicate that in some cases using external body condition measurements can be useful, and in many cases it is cost effective and time saving. They also demonstrate how care must be taken to prevent erroneous conclusions.

Notes on Shorebird Conservation in the Western Hemisphere

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A preliminary investigation of the literature reviews the status of shorebird conservation biology and their management; in all more than 700 publications, including all major national and international management plans, were obtained and more than 400 items are cited in this review. This draft document, which could eventually serve as one basis for a New York State shorebird management plan, does not focus solely on New York but covers many issues throughout shorebird ranges although primary emphasis is placed on the Western Hemisphere. This paper is broad enough in scope and time span (mid-nineteenth century to 2005) to discuss the significance of shorebirds to people, to inform about the research into their life histories, to indicate the significance of that research, and to point out where information may be lacking in the conservation management of shorebirds. This research reveals that there is no cure-all remedy for the plight of shorebirds and that there is a great need for a comprehensive New York State shorebird conservation plan.

Life History of the Fence Lizard, *Sceloporus undulatus*, in New York State

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We studied the life history of three *Sceloporus undulatus* populations in the Hudson Highlands region of New York State. From May 2003 to October 2004 we captured, measured and marked 158 individuals, recapturing 26 for a total of 243 observations. *S. undulatus* were observed active from mid-March to the end of October. Reproduction occurred primarily in April, May and June, and hatchlings were observed as early as August 7. Adults comprised 52% of the individuals sampled followed by young-of-year (yoy) and juveniles, at 33% and 15% respectively. Sex ratio did not differ significantly from 1:1 within any of the three age classes. Mean (+/- SE) growth rate was significantly higher ($t = -2.54$, $P < 0.05$) for immature individuals (yoy and juveniles) decreasing from 0.18 +/- 0.04 mm/day to 0.07 +/- 0.02 mm/day once individuals attain size of sexual maturity. Mean (+/- SE) snout-vent length was significantly different ($t = 9.45$, $P < 0.001$) between mature males (63.55 +/- 0.79 mm) and females (73.68 +/- 0.7 mm). Population density of adults was estimated to be 20.0 ind./ha. (95% CI = 2.74 – 66.93). This study focused on some of the most northern populations of *S. undulatus* and presents information that could be used to better understand geographic life history variation in this species. Our results also provide basic life history information essential for conservation and management of *S. undulatus* in New York State.

Deepwater Macrobenthic Survey of Honeoye Lake, New York

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Alum inactivation of deepwater sediment phosphorus has been proposed for spring 2006 in Honeoye Lake. A pre-treatment survey was conducted in summer 2005 to assess benthic species richness and total abundance, and to calculate several biotic community indices. Replicates from three different water depths were collected by standard Ponar dredge. Eighteen samples were within the 325 hectare proposed treatment zone and nine were in the immediately adjacent edge of the littoral zone. Sediment at deep sites (9m) had the lowest richness (6 taxa) with a density of 960 individuals/m^2. Midge fly larvae (*Chironomus* sp.) and annelid worms (*Branchiura sowerbyi*) dominated while phantom midge larvae (*Chaoborus punctipennas*) were frequent. Sediment from moderately deep sites (7m) had intermediate richness (9 taxa) with a density of 833 individuals/m^2. These samples also contained abundant midge fly larvae and annelids, as well as finger nail clams (*Pisidium* sp.) and statoblasts of the bryozoan, *Pectinatella magnifica*. Sediment of shallow sites (5m) had the highest richness (17 taxa) with a density of 1528 individuals/m^2. In addition to midge fly larvae and annelids, these sites also contained adult zebra mussels (*Dreissena polymorpha*), banded mystery snails (*Viviparous georgianus*), two other snails (*Valvata tricarinata* and *Physa* sp.), a leech (Hirudinea), aquatic sowbugs (*Asellus* sp.), scuds (*Gammarus* sp.), alder fly pupae (*Sialis* sp.) and a roundworm (Nematoda). Future surveys that will be conducted after alum treatment may reveal changes in benthic community structure related to the treatment and, if changes are detected, could also document recovery time for affected macrobenthic organisms.

Effects of Roadways on Amphibians and Reptiles in New York State

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Road mortality of amphibians and reptiles is a worldwide conservation concern and recently biologists have begun to assess the impact road mortality has on these organisms. We do not yet know the scope of the risks posed by road mortality to the viability of amphibian and reptile populations in New York, and there is little guidance available for engineers and managers on how to mitigate the problem, for example through appropriate placement of crossing structures along transportation networks. Our research will determine: (1) the impacts of transportation infrastructure on amphibian and reptile populations, and (2) optimal locations for crossing structures along roadways in New York. We randomly chose 125 locations within forest and field sites to conduct field surveys of herpetofaunal populations. Pitfall traps and coverboard arrays located along road verges will be used to assess relative abundances of amphibians and reptiles at different distances from roads. We will determine whether a "road effect" on populations occurs and, if it does, estimate the width of the effect zone. Further we will identify which local- and landscape-scale factors are most associated with herpetofaunal crossing activity near roadsides. We will use field data and a geographic information system to produce a model that predicts likely crossing "hotspots" or habitat linkages along unstudied portions of New York's roadway network. This will provide an effective tool for transportation managers who are actively involved in mitigation planning for amphibian and reptile mortality along New York roadways.

Status and Future Development of the Only Atlantic White-cedar Population in Pennsylvania

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We assessed the current status and potential future development of the only Atlantic white-cedar (AWC; *Chamaecyparis thyoides*) population in Pennsylvania (Spruce Flats Bog in Westmoreland County). We measured vertical height of all stems in the population and the diameter at breast height of stems ≥1.4 m in height. We also collected and analyzed increment cores from most large stems to quantify age distribution. Potential recruitment from the seed bank was assessed via the germination method using soil samples from 56 hummocks in the bog. The population consisted of 395 stems with stem size structure characterized by an "inverse-J" distribution; most stems (67%) were <1.4 m in height. The oldest individuals were established in the 1940s, but recruitment has been steady since initial establishment. No AWC seeds germinated from soil samples during a 14-month period, indicating that the bog's seed bank may have limited potential to contribute to recruitment. We suggest that this population has naturalized from plantings in the 1940s, with most recent recruitment having been vegetative. Because of previous extirpation of AWC from Pennsylvania wetlands, the naturalization of this population has conservation value. However, direct management of this population does not currently appear to be necessary in order to ensure its continued survival.

Conservation Assessment of North American Freshwater Gastropods-Preliminary Results and Discussion

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Working closely with the American Fisheries Society (AFS), NatureServe (http://www.natureserve.org), with an AFS subcommittee of freshwater malacologists, has been compiling a conservation status assessment of freshwater gastropod mollusks in North America. This assessment will be similar to previous AFS assessments for freshwater fishes, crayfishes, and mussels. The final evaluation will be based on our current understanding of freshwater gastropod taxonomy. Breaking with earlier assessments, this assessment will include global conservation rankings (G ranks) as well as categorical rankings (i.e., Endangered, Threatened, Special Concern...). Such global rankings are actively monitored by NatureServe, the North American Natural Heritage Network, and UNITAS. A draft evaluation of 689 native species (excluding subspecies, forms, varieties, and undescribed species) from all 50 U.S. states and 13 Canadian provinces was completed in late 2005 and is approaching final review. Preliminary results indicate greater than 75% of the freshwater gastropod fauna is at risk (G rank = GX – G3) in the U.S. and Canada with 85 taxa (12%) either extinct or presumed extinct. This is the highest imperilment rate for any major taxonomic group in North America, including freshwater mussels. The checklist is presented and comments and corrections are solicited. As these results are only preliminary, taxonomic, distributional, or status updates (i.e. corrections, additions, and deletions) are encouraged.

Alpine Frog Populations on Mount Washington, New Hampshire

Jones*, Michael T. (Graduate Program in Organismic and Evolutionary Biology, University of Massachusetts, Amherst, MA 01003)*

Wood frogs (*Rana sylvatica*), American toads (*Bufo americanus*) and spring peepers (*Pseudacris crucifer*) were observed at 1530 m and 1536 m on Mount Washington, NH, in 1999, 2000, 2001, and 2003. All observations were made in the Lakes of the Clouds, a cluster of glacial tarns on the southwest slope of Mount Washington's summit cone. The Lakes of the Clouds are approximately 100 m above treeline and have a maximum depth of 2.2 m with very little emergent vegetation. In early June of each year, wood frogs were heard calling from the Upper Lake, and tadpoles were observed in July 1999. Two wood frog eggmasses were discovered in 3 cm of water in June 2000. American toads were heard calling in the Lower Lake in June and July of each year, and several adults were observed every year. An adult toad was observed near the summit of Mount Monroe (1615 m) in July 2001. Spring peepers were observed and heard in both ponds from June to August of every year from 1999-2005. No metamorphosed juveniles of any species were observed. In addition to the three species reported above, I observed a male green frog (*Rana clamitans*) and an eastern newt (*Notophthalamus viridescens*). The surrounding vegetation is composed predominantly of wet tundra, krummholz conifers (*Abies balsamea* and *Picea* spp.), and alpine-arctic heath communities. This is the highest reported occurrence of these species in northeastern North America and the only populations reported from a tundra ecosystem in the eastern United States.

Soil Analysis at Brook Farm, New Paltz, NY

Jones*, Renee, Erica* ***Adamczyk****, Shafiul* ***Chowdhury****, and Adam* ***Watson*** *(Department of Geological Sciences, State University of New York at New Paltz, New Paltz, NY 12561)*

Brook farm is located in New Paltz, New York. It is an organic farm, which contains both crop and livestock. They use horse manure from a local source to fertilize their crop. We were interested in what makes a healthy agricultural environment, and how this information applies to Brook farm. We were also interested in the soil's properties: chemical aspects as well as grain size, in order to determine the physical condition of the soil. In order to make any reliable conclusions, we first found acceptable concentrations of ions in soil within agricultural settings such as Brook Farm, and then compared these numbers with our research. Here we found that the organic matter, as well as the concentration of nitrogen in the soil was relatively low. We have discussed why this is so as well as solutions for these problems in our paper. We encountered difficulties in determining grain size and time does not permit further study, although we feel comfortable in stating that the soil is slightly too clayey for ideal farming. Unfortunately, this is an uncontrollable variable. All other factors pertaining to the quality of the soil are within the range for successful farming.

Differential Habitat Selection in *Chrysemys picta* and *Chelydra serpentina* Metapopulations

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Census data compiled from 1997 through 2004 in Black Rock Forest (BRF), Orange County, NY, indicates the *Chrysemys picta* metapopulation (276 PIT tagged adults) of the 3785-acre preserve is differentially distributed amongst the seven ponds of the forest that each constitutes a discrete habitat patch. The presumed radiating source of the current metapopulation is the single natural pond which sediment coring indicates has been extant since glacial formation. Six anthropogenic ponds are 75-110 years old. Half of the adult metapopulation constitute a single local population within one anthropogenic pond. Other ponds have 9-12%, or 5-6% each. The *C. serpentina* metapopulation (51 PIT tagged adults) is distributed with three local populations of 20-24% each, including the glacial pond, three of 8-12% each, and one with 2%. Different factors that may have affected, and continue to affect, dispersal and distribution selection by the turtles were examined. The BRF watershed is high quality water, and the ponds are all part of the local water supply. Anthropogenic impacts such as pollution and habitat destruction are not contributing factors, though five of the artificial ponds have been drained at least once for maintenance. Within the forest, *C. picta* population density is positively correlated with dissolved oxygen, pH, and aquatic plant diversity/density. There is an inverse correlation with pond elevation. *C. serpentina* population density is positively correlated with pond elevation, and negatively correlated with dissolved oxygen, pH, and aquatic plant diversity/density. Additional physical water factors, aquatic insect diversity, and available nesting habitat need to be evaluated.

Migration Patterns and Wintering Range of Common Loons in the Northeastern United States

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The Common Loon, *Gavia immer*, breeds throughout the northeastern United States. Several surveys have assessed the abundance and distribution of summering loons; however, migration patterns and wintering range have not been adequately documented. Satellite transmitters were implanted in 17 Common Loons (16 adults and 1 juvenile) that were captured on breeding lakes in New York, New Hampshire, and Maine during the summers of 2003, 2004, and 2005. Thus far, transmitters on 10 of the birds have provided adequate location data to document movement to wintering areas. In most cases, the adult birds appeared to travel non-stop from breeding lakes, or neighboring lakes, to the Atlantic Coast. Adult loons marked in New Hampshire and Maine wintered 151 to 240 km from breeding lakes, off the Maine coast. Adult loons marked in the Adirondack Park region of New York wintered along the coasts of Massachusetts (425 km), Rhode Island (363 km), and southern New Jersey (527 km). A juvenile bird from New York made a number of stops at lakes and reservoirs en route to Long Island Sound. Maximum functional life of transmitters deployed was about 12 months, providing an opportunity to document spring migration movements as well.

Changes in Relative Abundance Determined from Breeding Bird Atlas Data over Time

***Kibbe**[*], Douglas (Box 34, Maryland, NY 12116)*

Breeding bird atlas projects have been completed in many states and, in a few, a second round of projects has been initiated. New York was the first state to complete two atlas projects, spaced twenty years apart. Breeding bird populations are seasonally resident and generally relatively stable from year to year unless habitat changes occur. One stated goal of atlas efforts, as yet unrealized, is to evaluate the changes in individual species that occur over time as their habitat is lost due to changes in land use. New York atlas data are now available to allow comparisons to be made between geographic areas over time. While the atlas maps permit graphical comparison of breeding distributions, to date no effort has been made to qualitatively compare the relative abundance of species using these data. Use of species occurrence and confirmation rates gives a relative measure of that species abundance. This measure of abundance can be graphically presented to portray the species' occurrence within a group

of atlas blocks, a county or the entire state. Data may also be used to quantitatively evaluate changes that have occurred over several decades. Data are presented for selected species from Otsego County. Otsego was the first county to achieve complete coverage in the most recent survey and was the county with the highest number of species found per block.

Sirex noctilio, the New York Story

Klass, Carolyn, and E. Richard **Hoebeke** (Department of Entomology, Cornell University, Ithaca, NY 14853)*

Sirex wood wasp, (*Sirex noctilio* Fabricious), an exotic species, was first identified in February, 2005 from a Lindgren funnel trap taken September 7, 2004 in Fulton, NY (Oswego Co.) A native to Eurasia and Northern Africa, it has been accidentally introduced into Australia, New Zealand, South Africa and South America. Our poster follows the development of the events in New York chronologically from the first identification to the results of an expanded trapping program for the 2005 season. Why the concern? This insect poses a threat to all stands of hard pine in New York including the Adirondacks. This exotic insect kills trees. In other areas where it has been introduced it causes significant tree mortality in pine plantations and is considered a major threat to hard pines. *Sirex noctilio* attacks living pine trees, while native woodwasps attack dead and dying trees. Females are attracted to stressed trees, and drill their ovipositors into the outer sapwood to inject a symbiotic fungus (*Amylostereum areolatum*), toxic mucus and eggs. Larvae feed on the fungus as they tunnel through the wood. Life cycle is generally thought to be one year, but may range from 3 months to 2-3 years.

Effect of Calcium Depletion on an Adirondack Terrestrial Food Chain: Preliminary Results

Krong, Jacob P., Jose **Medina**, James M. **Marusich**, and Timothy S. **McCay** (Department of Biology, Colgate University, Hamilton, NY 13346)*

Acid deposition has changed the structure and function of forested habitats in the Adirondack Mountain Region (Adirondacks) of New York State. Chronic acid deposition depletes essential nutrients, such as calcium, and leads to other undesirable soil-chemistry changes. This study, which is in its early stages, focuses on how calcium availability in the soil affects litter decomposition, soil invertebrates, and mammalian insectivores (shrews). Five sets of paired sites were studied in the Adirondacks and two sets were studied in Madison County, an area with well-buffered soils. Shrew sampling during summer 2005 suggested greater diversity of shrews at the Madison County sites than at the Adirondack sites. Fecal matter was collected to facilitate analysis of diet and calcium limitation. Leaf litter and soil at the forest floor were collected to determine the presence, abundance, and elemental composition of macro-invertebrates ($\geq$ 3mm length). Litter and soil from Madison County contained a greater density of macro-invertebrates than these substrates from Adirondack forests. Particularly noteworthy was the absence of earthworms from Adirondack samples. In autumn 2005 crushed limestone was spread on one site within each paired set in the Adirondacks to increase calcium availability. Future work will examine the biotic response to calcium amendment.

An Empirical Method for Determining Measurement Precision in Morphometric Studies

LaDuke**, Thomas C. and Stephen P. **Niedzwiecki (Department of Biological Sciences, East Stroudsburg University, East Stroudsburg, PA 18301)*

Personal measurement precision was defined, for this study, as the amount of variation within a dataset of replicated measurements made on a single element. Determination of personal measurement precision is a crucial, although often omitted, aspect of quantitative research. Traditionally, Model II ANOVA tests have been used to determine measurement precision but this approach results in unexpectedly high measurement error. For example, a study of American coots (*Fulica americana*) by Lougheed et al. (1991) had a mean of 13.98% measurement error (range 1.82–39.69%). We propose an empirical approach combining previously described techniques, such as standard deviation of the mean and the quadratic sum, produce more consistent results. In a study of woodchucks (*Marmota monax*) this technique produced a mean of 0.40% measurement error (range 0.04–1.47 %). Though laborious, our results suggest that future studies should make use of the proposed technique to more adequately address assumptions associated with measurement error.

A Comparison of Grassland Bird Detection Probabilities with Road-based and Field-based Counts

Lazazzero, Sarah A. and Christopher J. **Norment** (Department of Environmental Science and Biology, State University of New York College at Brockport, Brockport, NY 14420)*

We compared proportions of obligate grassland bird species detected using 100 m fixed radius point counts and unlimited distance point counts conducted from either the roadside or within fields. Within methods, we compared the proportion of species detected from roads using 100 m radius and unlimited distance point counts, and within fields using 100 m radius and unlimited distance point counts. Across methods we compared the proportion of species detected from roads and in fields using 100 m radius point counts, and the proportion of species detected from roads and in fields using unlimited distance point counts. Within both road-based and field-based methods, unlimited distance point counts generally increased the proportion of species detected, and the proportion of Eastern Meadowlarks (*Sturnella magna*) detected in fields increased significantly with unlimited distance point counts. Field-based point counts resulted in significantly higher proportions of Bobolinks (*Dolichonyx oryzivorous*), Grasshopper Sparrows (*Ammodramus savannarum*) and Savannah Sparrow (*Passerculus sandwichensis*) detected than with road-based point counts. For a more accurate assessment of grassland bird population indices, we recommend surveying grassland birds using field-based point counts that are ≥150 m from the road. In addition, Eastern Meadowlark and Northern Harrier (*Circus cyaneus*) presence would be better documented if unlimited distance point counts were used.

Song Detectability of Henslow's Sparrows (*Ammodramus henslowii*) in Jefferson County, NY

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We used binary logistic regression to model effects of time of season, location, moon phase and time of day on Henslow's Sparrow (*Ammodramus henslowii*) song detection probabilities over six-24 h periods at the Perch River Wildlife Management Area, Jefferson County, New York. Time effects were modeled by: 1) examining differences in nocturnal and diurnal song detection probabilities [DayNight]; and nesting song detection probabilities for each 3-h period within nocturnal and diurnal categories [Time(DayNight)]. Point location and Time(DayNight) significantly influenced Henslow's Sparrow song detection probabilities. Average Henslow's Sparrow song detection probabilities were generally highest between 03:00–06:00 h and 18:00–21:00 h, and under half and full moon phases. In general, nocturnal song detection probabilities were greater than diurnal song detection probabilities. However, strong interaction effects between moon phase, date and DayNight made it difficult to disentangle effects of these predictor variables on song detection probabilities. Our results suggest that survey designs targeting Henslow's Sparrows should consider the temporal and spatial variability associated with their song detectability, as well as possible regional differences in the species' singing behavior that could affect their detectability.

Reproductive Strategies of Cluster-laying Butterflies

Malone, Megan E., Heather C. **Michael**, and Ernest H. **Williams** (Department of Biology, Hamilton College, Clinton, NY 13323)*

Female butterflies face reproductive tradeoffs in egg size and egg number. Furthermore, total reproductive effort declines with female age because, while adult consumed nutrients may be replenished, nutrients from larval feeding and spermatophore provision are depleted. We studied the reproductive patterns of the Baltimore Checkerspot, *Euphydryas phaeton,* and the Pearl Crescent, *Phyciodes tharos,* both of which lay eggs in clusters. Fresh females were field caught in Oneida County, NY, maintained in cages in a greenhouse, provided leaves of appropriate hostplant, and fed a honey-water solution daily. Egg clusters were collected and counted each day, and samples of eggs were weighed. The data demonstrate an age-related decline in reproductive effort in both species. As females aged, they laid smaller clusters, and the delay between successive ovipositions increased. Furthermore, older females laid significantly smaller eggs. The smaller species, *P. tharos,* laid fewer eggs per cluster, oviposited more frequently, and produced smaller eggs, This comparison suggests that adult size adds another constraint to reproductive output. Our measurements illustrate nutrient limitation of reproductive effort in these butterflies.

Factors Affecting Mate Choice Decisions in Gammarus pseudolimnaeus

Mayack, Chris, Ethan **Kellogg**, Julie **Sahler**, and Kristi **Hannam** (Department of Biology, SUNY Geneseo, Geneseo, NY 14454)*

Amphipod crustaceans of the genus *Gammarus* exhibit sexual size dimorphism: males are larger than females, and engage in precopulatory mate-guarding behavior. We examined factors influencing mate choice in *Gammarus pseudolimnaeus*, a species found in cold hardwater streams in previously glaciated regions of New York and the Great Lakes. Size dependent mate choice was assessed in two laboratory experiments. Test individuals were collected from Spring Brook in Caledonia, NY—a tributary of Oatka Creek, and maintained in the lab at SUNY-Geneseo. Three pairs were selected from the holding tank and were separated and measured for length in millimeters. Two amphipods of the same sex, but at least 2mm difference, were placed in a 3x9cm container with 3cm of water depth. Finally, an amphipod (from the third pair) of the opposite sex was placed in with the two amphipods. Male amphipods chose the larger of two experimental females ($p=0.014$). Female amphipods showed no significant preference in choosing between two males of different sizes ($p=0.937$). This suggests that the male sex has more of an influence on mate choice than females. We will also report on two other ongoing experiments. In the first we are testing for the presence of a pheromone signal produced by females to attract males. The second experiment involves amphipods that parasitized by *Pomphorhynchus laevis*. We are testing whether the parasite affects sexual preference of males or females when choosing between an equal sized parasitized versus non-parasitized mates.

Use of Partially Predated Gastropod Shells by the Hermit Crab *Pagurus longicarpus*

McGuire, Beth M. and Jason D. **Williams** (Department of Biology, Hofstra University, Hempstead NY 11549)*

Although many investigations have focused on the importance of shell resources to hermit crabs, few studies have documented how these shells become available to hermit crabs. Field collections of *Pagurus longicarpus* from Long Island showed this hermit crab inhabited *Littorina littorea* shells that exhibited partial predation (soft tissue present but opercula removed). In fact, 28% (n=64) and 4.4% (n=158) of *P. longicarpus* inhabited *L. littorea* shells with soft tissue present from sites along Long Island, NY in 2004 and 2005, respectively. Based on these findings, laboratory experiments were performed to determine if *P. longicarpus* was attacking the snails or inhabiting shells that had been previously attacked by a spider crab predator. To determine the snail predator, *P. longicarpus* or *Libinia emarginata* were placed separately in tanks with live *L. littorea*. Another experiment was conducted to observe the hermit crabs' use of predated snail shells by removing the opercula of snails and offering the snails to hermit crabs in tanks. *L. emarginata* was shown to remove the opercula of *L. littorea* in the laboratory but abandoned the soft tissue, as found in specimens collected in the field. No predation events occurred in the tanks containing *P. longicarpus*. With the opercula removed, the majority of *P. longicarpus* switched shells and chose the partially predated shells. These findings are exciting since no studies along the east coast of the U.S. have focused on the use of such shells by *P. longicarpus* and this behavior may have important impacts on their populations.

Controls on Tree Species Response to Gaps Caused by Beech Bark Disease

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Beech bark disease is prevalent throughout the Catskill Forest Preserve, NY and has altered the species composition of the forest. Individual American beech (*Fagus grandifolia* Ehrh.) die slowly from the disease, often leaving gaps in the forest canopy. These gaps may be filled either by recruitment within the gap or lateral ingrowth of sub-canopy and canopy trees on the gap edge. One aspect of our research focuses on the role of substrate calcium and local tree species composition in determining which species eventually occupy the beech gap. To address this question 186 plots were established throughout the Catskill Forest Preserve in watersheds with a range of calcium availability, as indicated by stream calcium concentrations. Plots were centered around stumps of formerly canopy-dominant beech trees. In each plot several variables were measured including the abundance of trees in the local area. Species composition of the canopy space that the beech once occupied was measured using a camera-based point-quadrat method. Preliminary results indicate that sugar maple (*Acer saccharum* Marsh.) are relatively more abundant in the former beech canopy of watersheds with higher substrate calcium. Furthermore, beech declines in relative abundance in post-gap canopies, an effect which is magnified in watersheds with higher substrate calcium.

The Adirondack All-taxa Biodiversity Inventory Initiative

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An all-taxa biodiversity inventory (ATBI) is an information-gathering process supported by scientists and citizens to learn about the biodiversity of a specific place. In the Adirondacks a diverse group of individuals from public, private, academic, and governmental organizations have come together to develop a plan and rally support for an Adirondack ATBI initiative. The mission of the Adirondack ATBI initiative is to survey the diversity of life and connect people to the natural world through participation in biological inventories and related activities within the Adirondack Park of New York State. A project plan has been drafted which outlines a course of action to implement an ambitious and innovative ATBI model that combines scientific inquiry with active citizen participation. The plan has two broad themes: biodiversity survey and citizen participation. The biological survey has four goals: 1) perform the biodiversity inventory within an ecosystem and conservation framework, 2) coordinate among taxonomic working groups and the biodiversity inventory process, 3) develop and maintain a temporally and spatially-referenced database, and 4) coordinate with other ATBIs. Citizen participation has two goals: 1) community involvement and active citizen participation, and 2) appreciation of place-based biodiversity through art, culture and community.

Distributions of New York's Grassland Birds: Implications for Conservation

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Grassland breeding birds in the Northeast pose a unique challenge for conservationists, as they rely on anthropogenic changes to the landscape as habitat (e.g. farming). Current declines in grassland bird populations in New York are closely associated with the loss of farmland, and with reversion of landcover to later successional stages. Conservation efforts must be targeted at areas with existing populations of grassland birds, as well as at areas where farming and other activities will maintain the proper landscape. While the 2000 New York Breeding Bird Atlas provides preliminary information on the distribution of all bird taxa, it lacks the abundance data needed to precisely identify targets for conservation. During the summer of 2005, Audubon New York conducted surveys to assess the distribution and abundance of grassland birds and associated landscape factors in key areas of New York, while assessing the applicability of various point count techniques. These data will be used to coordinate conservation efforts (such as cooperative agreements and incentives) within focus areas by indicating which management activities are appropriate for the targeted species.

Health Assessment of Black-crowned Night Herons in New York Harbor Estuary

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The health of NY Harbor is in a constant state of flux due to declines in certain contaminants (PCB's, certain pesticides), increases in other contaminants (heavy metals, other pesticides), dredging practices, and changes in local and regional water quality. Black-crowned Night Herons (*Nycticorax nycticorax*), a species nesting on multiple islands in the NY Harbor, serve as excellent indicators as they can accumulate toxins. Because the herons are top predators and generalized feeders, and because adults forage in different places in NY Harbor depending on which colony they are nesting at, they serve as environmental sentinels, or health proxies, for specific regions of the NY Harbor Estuary ecosystem. In an effort to assess the health of the NY Harbor ecosystem, we collected blood, feather and regurgitant samples from heron chicks on North Brother, Goose, Hoffman, and Canarsie Pol Islands in 2004 and 2005. Blood samples were analyzed for hematologic health parameters: packed-cell volume (PCV), total plasma solids (TS), white blood cell count (WBC), and differential white blood cell counts. WBC was significantly different between North Brother (24,131 cells/μl ± 2,520) and Hoffman (15,487 cells/μl ± 1,466) in 2004. WBC on North Brother was higher than on Hoffman. Biochemical blood analyses, feather metal concentrations, and contaminant concentrations in prey items are currently underway and will complete the assessment of the effects of contaminants on the health of herons in NY Harbor.

Mechanisms of a Trophic Cascade in the New England Rocky Intertidal

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Indirect effects like trophic cascades have an important influence on community structure by regulating changes in species densities at multiple trophic levels. On the rocky shores of the Gulf of Maine, an increase in the predatory Jonah crab, *Cancer borealis*, occurs when gulls (*Larus argentatus* and *L. marinus*) are excluded from foraging in the intertidal zone. In contrast, the related rock crab, *Cancer irroratus,* does not increase. Correlated with higher densities of *C. borealis* are declines in the densities of two intertidal gastropods: the herbivorous periwinkle *Littorina littorea*, and the carnivorous dogwhelk *Nucella lapillus*. This study investigated differences between the two *Cancer* species that may explain why *C. borealis* migrates up into the intertidal zone and *C. irroratus* does not. Using a tethering experiment, we examined vulnerability to predation as a function of depth and found that *C. irroratus* had lower survivorship in the intertidal zone than *C. borealis*. Gut content analyses and laboratory prey preference experiments revealed that *C. irroratus* eats fewer and smaller snails than *C. irroratus*. The abundance of gastropods (primarily *L. littorea* and *N. lapillus*) is strongly correlated with depth: these species are extremely abundant in the low intertidal and virtually absent from the shallow subtidal. Thus, *C. irroratus*, unlike *C. borealis*, may receive little benefit (in increased food availability) from migrating upshore into the intertidal zone. Additionally, although both *Cancer* species face increased predation risk from gulls in the low intertidal zone, the increased risk is higher for *C. irroratus* than for *C. borealis*.

An Exploration of the Origin and Significance of Oyster Middens in Riverdale Park

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Oyster shells were noticed through casual observation in Riverdale Park in the Bronx. There are several hypotheses as to how these oysters could have gotten to the park, which is adjacent to the Hudson River. Could they have gotten there through a flood? Could they have gotten there through discards of Native Americans or colonials? Did the Urban Park Rangers deposit them in an effort to counter acidic soils caused by acid rain? Since there are no signs in the park that depict the origin of these shells, we are embarking on a journey to discover it for ourselves. We have recovered and measured over 200 oyster shells from regions that are called "middens" that we believe are *Crassostrea virginica.* Upon further research, we have reason to believe that they were discarded by Native Americans or Colonials, because there have been numerous middens discovered up and down the east coast that have been formed in this fashion. Soil at three middens was tested and the pH was compared to soil taken from places where shells were not recovered. NKP was also taken. We intend to radiocarbon date some of the shells in an attempt to ascertain the time of deposit. This will give a historical framework for their time of deposit that is important in light of the recent interest in oyster restoration in the Hudson River and other places in the New York/New Jersey Harbor estuary.

Community Structure of Freshwater Macroinvertebrates and Adjacent Land Use

***Norland**[*], Benjamin E. and Ernest H. **Williams** (Department of Biology, Hamilton College, Clinton, NY 13323)*

Stream communities are affected by the conditions of the surrounding landscape. We explored the relationship between land use and diversity of benthic invertebrates in the Oriskany Creek, Oneida County, New York, a tributary of the Mohawk River. For analysis, we collected five randomized samples of macroinvertebrates from each of four sites with different adjacent land usage: corn field, rock quarry, golf course, and forest (control). We tested the hypothesis that the effects of differing land use would be immediate and noticeable on the adjacent stream community. Our primary analysis was of community diversity. One control site was sampled intensively to provide a reference collection of macroinvertebrates present in the Oriskany Creek. Early results suggest that sites with altered land immediately adjacent support lower community diversity and evenness than the control sites. These data confirm local land effects on stream communities and support the use of macroinvertebrate communities as effective indicators of stream and watershed status.

Status of 2004 and 2005 NYS Marsh Bird Surveys

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In April 2006, the New York State Department of Environmental Conservation Bureau of Wildlife staff will begin its third and final field season for the Marsh Bird Conservation Project. In 2004 and 2005, thirty-three sites, on public lands, were surveyed for pied-billed grebe (*Podilymbus podiceps*) (state threatened), least bittern (*Ixobrychus exilis*) (state threatened), American bittern (*Botaurus lentiginosus*) (state species of special concern), king rail (*Rallus longirostris*) (state threatened), sora (*Porzana carolina*), and Virginia rail (*Rallus limicola*). Marsh bird species face a variety of threats including: the loss of habitat to development; the replacement of hemi-marshes with dense monocultures (cattail, etc.); and the invasion of nonnative plant species, such as purple loosestrife (*Lythrum salicaria*) and phragmites (*Phragmites australis*). Due to their secretive nature and the dense breeding habitat of some marsh-nesting species, knowledge of their biology, habitat use, distribution, and abundance is limited and monitoring is difficult. Our survey methods used call-response techniques that were modeled after the Standardized North American Marsh Bird Monitoring Protocol (Conway, 2002). This presentation will summarize data obtained during the 2004 and 2005 field seasons and job objectives for this year's final field season.

Long-term Patterns in Rotifer Diversity in Lake Champlain: 1992–2005

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This study focused on long-term patterns in rotifer communities in Lake Champlain from 1992–2005. Data from five sites around the lake in the summer season (July–August) were analyzed to determine patterns of rotifer species abundance and richness. Rotifer abundance and richness began to decline after 1994 in all sites. Overall zooplankton community trends showed change from dominance by rotifers to cyclopoid copepods in the late 1990s. We observed species composition shifts in rotifers with a very diverse rotifer community make-up from 1992-1996, a decline in rotifer species richness and abundance from 1996 to 2001 and, in recent years, some recovery of species richness toward pre-1996 levels. Rotifer species richness has increased in recent years at several sites. Rotifer abundance, however, at all sites remains low compared to other zooplankton species. Some taxa that were abundant in the early years of the study (1992–1994) were not observed at any study site from 1996 to the early 2000s but were observed again in recent years. For example, *Filinia spp*. reappeared at one site in the summer of 2003, and was present in two sites in 2005. Other taxa (*Ascomorpha spp.* and *Gastropus spp.*) were absent from samples at all sites since 1996, and reappeared in 2003. The decline in Rotifers in the mid 1990s has been attributed to zebra mussel invasion in Lake Champlain while the mechanisms for the recent recovery are less clear. Trends in abundance suggest the recovery is in its early stages.

Sunlight and Soil pH Influence Rome Sand Plain Lupine Habitat Restoration

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Three summers after removal of white pine trees from experimental plots we fail to observe dramatic increases in a Rome Sand Plains population of wild blue lupine (*Lupinus perennis* L.), the host plant for the NY threatened frosted elfin butterfly *Callophrys irus* (Godart). Our objective was to assess how above and below-ground factors affect lupine restoration success. In this analysis we use lupine cover and flowering stem count data from four cardinal quads in octagonal plots surrounding white pine trees that were removed or left as controls following an initial measurement in 2002. For each quad, soil core samples (0–20 cm) were analyzed for pH in water and transmitted light was assessed using hemispherical photographs (GAP Analyzer Software). We found that tree removal quads had both significantly higher average transmitted direct light and soil pH than control plots, and that soil pH and light were positively correlated. A 2002 to 2005 comparison showed that the number of lupine flowering stems have tended to increase in tree removal quads and decrease in control quads. Applying a multiple regression model, we can explain the lupine response on the basis of pH and light. High pH and intense light were most conducive to lupine restoration. Interestingly, the effects of pH and sunlight on lupine response cannot be separated; rather, these above and belowground factors seem to work in tandem when influencing lupine response.

Effectiveness of Turtle Survey Techniques in West Virginia

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Many methods of inventory have been used worldwide to capture and observe turtle species. Some techniques include live capture with traps and nets and visual surveys with binoculars and spotting scopes. During the summer of 2003, a statewide inventory of West Virginia aquatic turtles was implemented employing some of these methods. Live capture was conducted with fyke nets, catfish traps, basking traps, and large hoop nets. Visual surveys were done with spotting scopes and binoculars. The data was analyzed to determine capture efficiency and effectiveness for each method and includes a discussion on the advantages and disadvantages for each technique.

Invasive Plant Inventory of Thacher State Park: An Ecological Community–Habitat Approach

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John Boyd Thacher State Park is a designated New York State Bird Conservation Area, which provides habitat for over 180 avian species. Additionally, several floristic and faunal species, as well as ecological communities, have state rankings for protection. Efforts to assess and to manage the spread of invasive species are fundamental for the protection of biodiversity and habitat viability. Recognizing the approximately 2000 acres of parklands as a network of ecosystems, our approach was to establish an ecologically based inventory format. Reports (2000, 2004), from the New York Natural Heritage Program (NHP) which included ecological community mapping were utilized. An invasive plant survey of Thacher State Park's natural areas was conducted in 2005 to establish a list of invasive species and determine their distribution. Seventeen Ecological Communities identified by NHP were condensed into twelve Ecological Community-Habitats (ECH) totaling 1659 acres. Occurrences were recorded with GPS and digital photography. Standard random sampling and random plot techniques were employed. Nine invasive plant species were identified; *Alliaria petiolata, Centaurea biebersteinii, Elaeagnus augustifolia, Fallopia japonica, Lonicera spp., Lythrum salicaria, Phragmites australis, Rhamnus cartharica and Rosa multiflora.* All twelve ECHs surveyed had some occurrence of invasive plants. The most widely distributed invasive plants, *Lonicera spp.* and *Rhamnus cartharica*, were present in all twelve ECHs. Most notable was the absence of *Lythrum salicaria* in one of two wetlands. *Elaeagnus augustifolia* and *Fallopia japonica* have the greatest probability of being eradicated based on their limited distributions.

Using Breeding Bird Data to Evaluate Habitat-based Wildlife Corridor Mapping

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Bird species presence data from the New York State Breeding Bird Atlas (1980–85) were used to test the hypothesis that the abundance of breeding bird populations inside the Algonquin to Adirondacks (A2A) Corridor in northern New York State is higher than the breeding bird abundance outside the Corridor. The mean abundance of the 160 bird species observed during the breeding season within the study area (~20,000 km^2) including the New York portion of the Corridor was 22.4% higher inside versus outside the Corridor. The guild with the greatest mean abundance within the Corridor included the "chickadees, nuthatches & allies-tanagers, cardinals & allies" (19.3 blocks – 5 × 5 km^2) followed by the "woodpeckers" (18.0 blocks). The least abundant guilds within the Corridor were the "ducks, duck-like birds & swimming birds" (2.3 blocks), "finches & old-world sparrows" (5.4 blocks), and "birds of prey and foul-like species" (5.8 blocks). Eleven bird guilds were more abundant inside the Corridor by at least 16%, however, only five of these guilds had differences that were statistically significant. This study shows that breeding birds in northwestern New York State generally prefer the A2A Corridor area, however, future work is needed to do similar analyses for other groups of taxa such as mammals, amphibians and reptiles, and vascular plants.

Microhabitat Selection and Food Use in Adirondack Headwater Streams in Northern New York

***Ragusa**[*], Erica and Timothy **Mihuc** (Lake Champlain Research Institute, SUNY Plattsburgh, Plattsburgh, NY 12901)*

Benthic invertebrate microhabitat preferences were sampled in several headwater streams in Northern New York across three habitat types: leaf pack, bedrock, and cobble. Each microhabitat provided different substrate and/or food sources for benthic macroinvertebrates. All streams were found to be high in allochthonous resources (external inputs) but low in autochthonous resources. Insects were sampled in each type of microhabitat, with several taxa showing preferences for either

leaf packs, bedrock or cobble. Leaf pack sites were found to have the greatest species richness and the highest diversity of taxa. These sites also had the greatest biomass of available food resources. The bedrock sites of one stream were found to have the highest invertebrate densities. These sites contained primarily moss as habitat and as available food. The bedrock and cobble habitats provided periphyton as a food resource but were visited by individuals that utilized detritus as well. Feeding habitats for select macroinvertebrate taxa were determined to assess resource use across the habitat types. *E. Dorothea, H. Epeorus, B. Baetis*, and *P. Isoperla* were present in all types of microhabitats in both streams. These species were found to allocate the same type of resource in all microhabitats.

Eutrophication of the Lower part of the Great Patchogue Lake

Rana, Mohammad, Katty **Edmond***, Nadia **Ghazanfar***, and Mirna **Portillo*** (Biology Department, St. Joseph's College, Patchogue, NY 11772)*

Eutrophication of the Lower part of the Great Patchogue Lake. This lake is located in Suffolk County New York, in the town of the Patchogue. It is connected to Upper Great Patchogue Lake and Cannon Lake on its north. It is also attached to the Great South Bay through Patchogue River. (The water flow is from north to south.) The lake appears to be at the last stage of the eutrophication, it is covered by many islands, thick algal bloom, the depth is very shallow (1–2 feet), and the rooted plants mostly cover the benthic zone. This lake is contaminated by high levels of phosphate (0–4ppm), nitrate (0–30ppm), lead (0.1–5.0ppm), cadmium (0.11–1.0ppm), and the water is turbid (20–100JTU). Our studies indicate that the sedimentation rate of the lake is very high possibly due to high levels of nutrients and heavy metals (the source of the nutrients and heavy metals and their relationship with sedimentation will be discussed in the conference). To save the lower part Great Patchogue lake, the aquatic plants must be removed, the islands must be dredged, the nutrients and heavy metals might flush out after dredging otherwise they should be removed by phytoremediation (which will also be discussed at the conference).

Phytoremediation of Contaminated Long Island Lakes

Rana, Dr. Mohammad, Jessica **Fassois***, Anthony **Rotella*** and Jackie **Salerno*** (Biology Department, St. Joseph's College, Patchogue NY 11769)*

Heavy metals are one of the factors responsible for the eutrophication of Long Island lakes. Cadmium is fatal to aquatic organisms. High concentrations of cadmium (1.0–18.6ppm) have been observed in some Suffolk County lakes in Long Island, New York. EPA standard for drinking water cadmium range 0.001–0.005ppm .Two lakes in Suffolk County (73º 18′30″ W, 40º 44′ 15″ and, 40º 43′ 45″ N) showed very high concentration of cadmium (18.6ppm). This cadmium can easily affects human through bioaccumulation in fish. Aquatic plants *Lemna minor, Azolla caroliniana,* and *Salvinia minima* were used for phytoremediation at 5.7 ppm Cadmium concentration. It seems that *A. caroliniana in 17.33 g/ L of water* is capable of removing cadmium at 84.35% per week .A similar trend was observed in other two plants .Mostly Cadmium accumulated in the roots, while some in the vascular tissue of shoot and leaf chloroplast. Cadmium appears to have damaged the root system of *A. caroliniana* in 15 days. Similar damage was not observed in the root system of other plants. It was interesting to note that *L. minor*, decreased the cadmium concentration in the first week, and increased in the second week. Vacuoles probably might have released cadmium into the water due to lyses. Cell death was observed in some root cells. Our preliminary studies indicate that phytoremidiation be tried in lakes with lower cadmium concentration(less than 5ppm) and plants should be removed within 2 weeks for incineration.

Urban Typology and Wetland Functioning

Rauch, Shannon, Tess **Pollinger***, Gary **Kleppel** (Department of Biological Sciences, University at Albany, Albany, NY 12222)*

We examine the impact of urban typology on emergent marsh wetland ecosystems in the Hudson Valley by comparing wetlands that drain traditional small towns with wetlands that drain suburbanized watersheds. It has been shown that urbanization stresses the environment and degrades ecosystems. We tested the null hypothesis that there is no difference between the impacts of traditional small towns and suburbs on wetland ecosystem functioning. We collected environmental and ecological data (e.g., conductivity, temperature, plant biomass, trophic transfer) from each of 5 wetlands in watersheds dominated by traditional small towns and wetlands in suburbanized watersheds. We also collected information on land use and land cover (e.g., buffer width, impervious surface area) from orthophotoquads and demographic data (urbanized area/person) from census and GIS databases for each watershed. Student's t-tests revealed that wetlands in suburban and traditional watersheds differed ($p<0.05$ or better) with respect to apparent runoff (i.e., conductivity), trophic transfer and importance of invasive species in the emergent plant

community. Factor analysis was used to identify the environmental and ecological variables associated with urban attributes. Quantitative expressions were then derived for strongly related urban and ecological variables, by least squares regression. Our research, which is ongoing, suggests that there are relatively benign alternatives in urban development in the Hudson Valley

Tannin Concentration and Rates of Decay in Large Seeds

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Tannins serve both to deter herbivores and to retard decay, a factor that alters the behavior of seed predators. We studied the hypothesis that higher tannin content in large seeds results in slowed or reduced decay and reduced insect infestation. Through the fall we collected seeds from native and non-native oak, hickory, and walnut trees in Clinton, NY, mostly from the Hamilton College campus, and kept them at 4ºC for observation at different times after collection. At different intervals we split the nuts and assessed the amount of decay and presence of insect larvae in the seeds. For analysis of tannin content, endosperm samples were dried, pulverized, and extracted with 50% methanol; we used a radial diffusion technique to quantify the amount of tannic acid equivalents in each sample. Early results show higher rates of decay and infestation in acorns than in walnuts and hickory nuts and higher rates of decay in swamp white oak (*Quercus bicolor*) than in northern red oak (*Quercus rubra*). The results show that infestation and decay are correlated with tannin content.

Waterbird Mortality as a Result of Type E Botulism in Lake Erie and Lake Ontario

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Department of Environmental Conservation staff are familiar with outbreaks of type C botulism, which periodically cause heavy mortality. Type E botulism, and its devastating effect on migrating waterbirds, is a new phenomenon. The first observed outbreak in the eastern basin of Lake Erie occurred November 2000. To monitor and evaluate the impact of type E botulism on waterbirds, thirteen 500-meter transects were surveyed along the Lake Erie shoreline. This survey was replicated during fall 2001through 2005. During 2002 through 2005, surveys were also conducted along the Lake Ontario shoreline. Forty-seven transects were monitored during the peak of Common Loon, *Gavia immer,* migration, 16 October to 14 November. Predicted mortality for the Lake Erie shoreline was calculated. During 2000 through 2005 an estimated 5415, 2862 17301, 3008, 5943 and 2151 waterbirds died from type E botulism. Waterbird mortality was first documented on Lake Ontario during 2002. Predicted waterbird mortality on Lake Ontario for 2002 through 2005 was estimated to be 1046 1529 1693 and 1193. The single waterbird species with the greatest mortality differed each year. Red-breasted Merganser had a predicted mortality of 2479 in 2000; Common Loon 1149 during 2001; Long-tailed Duck 13219 in 2002; in 2003 Common Loon predicted mortality was 2101, in 2004 2915 and in 2005 1656.

A New Species of Megalograptus, Late Ordovician Martinsburg Formation, Southeastern New York

Rounds, Carolyn A. and Russell H. **Waines** (Geology Department, State University of New York at New Paltz, New Paltz, NY 12561)*

Recently, a eurypterid prosoma with related appendages, *Megalograptus n.sp.,* was collected from Minnewaska State Park Preserve in Ulster County. *Megalograptus n.sp.* was observed to display features unlike those of any previous eurypterid found in this area. The specimen exhibits a number of spines protruding from the second paired prosomal appendage, somewhat similar to the species *Megalograptus ohioensis* (Caster and Kjellesvig-Waering, 1955). However, the features observed on the dorsal side of the second paired prosomal appendage, specifically of the second and third joints, indicate that *Megalograptus n.sp.* is a separate species from *Megalograptus ohioensis*. The second joint of *M. n.sp.* differs from that of *M. ohioensis* in that it is almost completely covered with scales, while the same joint of *M. ohioensis* is only ornamented with scales along the outer edge, opposite the spines (Caster and Kjellesvig-Waering, 1964). On the third joint of the second paired prosomal appendage, *M. n.sp.* bears a spine that is much more robust than the spines of the same appendage and joint of *M. ohioensis* (Caster and Kjellesvig-Waering, 1964). Scales completely cover the third joint of *M. n.sp.*, which is not apparent in *M. ohioensis*, where the scales are limited to the outer edge of the third joint (Caster and Kjellesvig-Waering, 1964). There are fewer spines on the second and third joints of the second paired prosomal appendage of *M. n.sp.* than on *M. ohioensis* (Caster and Kjellesvig-Waering, 1964). Based on these points of difference, *Megalograptus n.sp.* appears to be a separate species from *Megalograptus ohioensis*.

Prediction of Invasive Plant Species Distribution in the Catskills using Logistic Regression

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The threat to natural ecosystems by invasive species is fairly well documented, but information on specific species distribution and their level of infestation upon the landscape is lacking. This type of information can be very costly and time consuming to collect, but is essential in aiding land managers in determining where to pool resources, prioritize control efforts and identify areas that may be prone to invasive colonization. There is little data on the current infestation of invasive plant species within the Catskills. This region is characterized by several different human uses and is valued ecologically due to the presence of rare species and communities. Presence/absence data collected by The Nature Conservancy in two forest matrix blocks was used to develop prediction models of 5 known invasive plant species throughout the region. These include garlic mustard (*Alliaria petiolata*), bush honeysuckle (*Lonicera* spp.), Japanese barberry (*Berberis thunbergii*), multiflora rose (*Rosa multiflora*) and Asiatic bittersweet (*Celastrus orbiculatus*). We developed logistic regression models using climate, terrain, census, transportation, and geologic variables. Preliminary results indicate that some of the most important predictors include land use, population, precipitation, elevation and soils. Each model was validated and verified. The finalized models were then used to develop predictive distribution maps for the 5 invasive species, in the 4 remaining forest matrix blocks.

Regeneration of American Chestnut (*Castanea dentata*) (Marsh) Borkh. in the Shawangunk Mountains

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Ten permanent plots were established in the Shawangunk Mountains in 1977 by D. Guertin and K. Beard to sample American Chestnut trees >4cm dbh and sprouts <4 cm dbh. All trees and sprouts within the plots were measured and counted. Basal area and density calculations were performed using the collected data. The plots were resampled in 1982 by K. Beard and S. Wright and again in 2004 by the authors. In all but two plots basal area per hectare decreased considerably over the 27 year period. In the majority of plots sprouts per hectare increased between 1977 and 1982; however in 2004 sprout density demonstrated a marked decline. At first a cyclical pattern was proposed whereby trees decreased in response to the blight and sprouts increased from the existing root stock of individual tress. However the 2004 study indicates that trees and sprouts are at an all time low. Upon examining tree and sprout densities over the course of the three studies it is apparent that Chestnut is declining over time and its future existence is in question.

Five Years Counting Loons in the Adirondacks—Preliminary Results of ACLP Census

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The Adirondack Cooperative Loon Program (ACLP) is dedicated to improving the overall health of the environment, particularly the protection of air and water quality, through research and education efforts focusing on the common loon (*Gavia immer)* and regional conservation issues affecting wildlife and their habitats in the Adirondack Park. A Species of Special Concern in New York State, the common loon breeds in the 6 million acre Adirondack Park, which is in the southernmost extent of its breeding range. From 2001–2005, the ACLP has conducted a citizen science survey, using single-survey point counts, to record the presence and absence of adult and juvenile loons on waterbodies in and around the Adirondack region. Information has been collected from 337 lakes and ponds, 223 of which have had repeat surveys for 2 or more years. Preliminary analysis of the results from the Annual Loon Census enables the ACLP to estimate population status and examine the distribution, age class and long-term trends in the Adirondack breeding loon population. This information has been utilized by the NYS Department of Environmental Conservation in the development of Unit Management Plans, the NYS Natural Heritage Program, Audubon New York for identification of Important Bird Areas, the Adirondack Park Agency for evaluation of potential shoreline development sites, and has contributed to the NYS Breeding Bird Atlas.

Focusing a Water Quality Monitoring Program

Schlesinger, Richard C. (Monitoring Coordinator, Hoosic River Watershed Association, Williamstown, MA 01267)*

The Hoosic River watershed, some 720 square miles in three states with about 1100 stream miles, creates a challenging problem for a small watershed association's monitoring efforts. Since its establishment in 1986, the Hoosic River Watershed Association (HooRWA) has conducted water quality monitoring at various locations in New York, Massachusetts and Vermont, generally no more than 15 to 20 sites per year. As the monitoring program has matured, we determined that we needed to better focus our limited resources on the most critical areas of the rivers, with the first step being to identify those areas. To do so, we created a GIS project to summarize the effects of slope, land use, soil erosion potential and permeability, and proximity to roads to identify areas of the rivers and streams most likely to be of concern for non-point source pollution. Of the 417 areas initially selected by this procedure, 114 were identified as medium to high priority areas for monitoring using other state-specific GIS layers (e.g., orthophotos, endangered species habitat) for each of the three states. The GIS project will provide a framework for additional data as they become available and for linking photographs and descriptive documents of the identified locations to better focus our monitoring efforts and contribute to HooRWA's efforts toward the restoration, conservation and enjoyment of the Hoosic River and its watershed.

Monitoring Aquatic Bird Abundance in Northeastern US

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Lack of coordination in bird monitoring programs among agencies, institutions, and programs has resulted in much redundancy and inefficiency in data collection and management, and has resulted in an inability to address management issues that typically cross jurisdictional borders. A project to address these issues is being developed with state agency and other partners in order to implement a regional bird monitoring framework in the Northeast region. The project will assist States and other organizations in improving the coordination and effectiveness of their monitoring efforts and serve as a model for other regions of the country. A regional monitoring framework document and associated web site will be completed in order to document consensus about regional monitoring priorities and provide easily accessible resources for implementing coordinated bird surveys across the region. A regional data management system will also be developed so that data collected through the regional monitoring framework will be securely stored and easily accessible for data analysis and queries. The expected results are a model regional bird monitoring framework that can be used in other regions of the country, fully designed and implemented new monitoring programs, and a coordinated regional data management system. These results meet an identified National Conservation Need by developing and implementing an improved monitoring system which will help build the fundamental basis for science-based bird conservation.

Forest Patch Size and Surrounding Landcover: Correlates of Amphibian and Reptile Biodiversity

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Forest fragmentation has variable effects on natural communities, depending on how species respond to the combination of habitat loss, isolation, and edge effects. Reptiles and amphibians are generally considered highly sensitive, due to their complex lifecycles and migratory behaviors. We examined species richness and abundance of herpetofauna in forest patches embedded in rural, suburban and urban landscapes of NY, NJ, and CT, visiting 39 patches in 2004. In 2005, we repeated this for 29 patches and added 3 large forest tracts as reference sites. We estimated patch area, patch quality, and proximity to nearby forests and wetlands, as well as proportions of surrounding landcover categories and road density within 4 different zones (50m, 250m, 500m and 1km buffers). A total of 24 species were found, representing 80% of species expected to occupy these habitats. Total amphibian and reptile species richness pooled was positively correlated with forest patch area. This species-area relationship held for taxonomic subgroupings (Anurans, Caudates, Squamates, Testudines, Ranids), as well as subsets of sensitive and/or rare and common species ($P<0.05$ in all cases). Sensitive and rare species were generally restricted to large forests or larger patches within a forest-dominated landscape ($P<0.001$). The distribution of common species was positively associated with the presence of wetlands and patch area ($P<0.05$). Most species assemblages were correlated with landcover patterns within 250 m of the forest patch. Although patch size alone was a reasonable estimator of coarse-level diversity, predicting species-specific distributions required more detailed information on patch quality and surrounding landuse.

Invasive Burning Bush (*Euonymus alatus*): Reproduction, Vulnerability, and Effects on Native Flora

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Burning bush (*Euonymus alatus*), a species native to Asia, forms dense patches in the forests of the northeastern United States and is currently invading the North Woods in Saratoga Springs, NY. To our knowledge, there are no published studies focusing on the ecology of *E. alatus*. Here, we focus on the distribution, reproduction, and vulnerability of *E.alatus* to natural enemies. Within the woods, *E. alatus* is more common near human-modified habitats. No plants with trunk diameter < 20 mm produced flowers or fruits, and seed production increased exponentially with trunk diameter after that point. Control efforts should focus on these larger plants. Most fruits were consumed by frugivorous birds, although seeds placed on the ground were much more likely to be collected by nocturnal mammals rather than by birds active during the day. Nocturnal foragers were also more likely to collect clumped seeds than evenly distributed seeds. Herbivory rates were generally low (< 5% of leaf area lost). Preliminary results from an ongoing study of interspecific competition, one that tests the effects of burning bush on the density and diversity of spring herbaceous plants, are also presented.

Interference Risk and Calling Behavior of the Gray Treefrog, *Hyla versicolor*

Schwartz, Joshua J., Robert **Brown**, and Kola **Dushaj** (Department of Biological and Health Sciences, Pace University, Pleasantville, NY 10570)*

Male gray treefrogs call to attract females under challenging acoustic conditions. With increases in chorus density, background noise levels and the chance that male calls will be overlapped increase. Call overlap may jeopardize the probability of mating because females prefer advertisement calls in which the internal pulse structure of calls is not obscured to those that are overlapped by other calls. With increases in the level of acoustic stimulation, males lengthen the duration of their calls but simultaneously reduce call rate such that 'pulse effort' changes little. We tested the 'interference risk hypothesis' which proposes that males change their calling in a fashion that insures that, on average, there will be a sufficient number pulses and interpulse intervals clear of acoustic interference *per call* to attract a female. However, a series of female choice experiments employing call alternatives of different durations, rates, intensity levels and degrees of call overlap refuted this hypothesis. Results leave open the possibilities that the dynamic shift in the two components of pulse effort are related to the problem of call detection in a noisy environment or are responses by males to the perceived threat of competition for females. [Work supported by NSF]

The Stopover Ecology of Neotropical Migratory Birds in an Urban Park

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Due to the overlap of the Atlantic Flyway with one of the most urbanized regions of North America, the habitats remaining within cities may play an important role in bird migration. Yet, the use of urban parks by migrating birds is currently poorly understood. To determine if an urban habitat is serving as a suitable stopover site, we investigated the energetics of 8 species of migratory songbirds in Bronx Park (Bronx, NY) during two consecutive spring and fall migrations. Fat score, body mass, and rate of mass gain of birds of different ages and sexes were compared within and between migration seasons. Flight ranges were also calculated. Fat score and condition index was significantly higher in spring for most species. There were few significant sexual differences in fat score or condition index in spring, and few age-related differences in fall. Rate of mass change was positive in 12 of 17 instances. Rate of mass gain was greater in spring than fall for most species. Flight ranges were comparable to those calculated in studies in rural areas and suggest most migrants in Bronx Park store enough energy to fly longer distances than are possible in the course of one night. High fat scores, condition indices and flight ranges, and positive rates of mass gain suggest the study site is a place where migrants can sufficiently restore depleted energy reserves. These findings highlight the importance of conserving and properly managing the green spaces remaining in urban areas situated along migratory bird flyways.

Dietary Habits of Diamondback Terrapins of Jamaica Bay, New York

***Sierra**, Rafael and Russell L. **Burke** (Department of Biology, Hofstra University, Hempstead, New York 11549)*

Diamondback terrapins are brackish water turtles whose dietary and nesting habits may play an important role carrying marine nutrients into the low-nutrient terrestrial beach environments. They may also have a significant effect on prey populations. Previous studies of terrapin feces suggested that they mostly eat invertebrates, but these studies were short term and may have been biased against soft tissue prey. I analyzed terrapin fecal samples and stomach contents from 21 turtles to determine their food habits. Fecal samples were obtained by soaking the turtles in fresh water; stomach contents were collected by flushing the stomach. I observed that the diet was highly variable and included different type of food items such as gastropods, jellyfish, marine plants and marine annelids.

The Vermont Butterfly Survey

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The Vermont Butterfly Survey (VBS) is a five-year (2002–2006) census to document the relative abundance and distribution of butterflies across Vermont. Field work has been conducted by volunteers, who have built a database of more than 20,000 recorded encounters with more than 100 butterfly species, 15 of which had never been recorded in the state prior to this effort. VBS has enhanced our knowledge of the distribution, relative abundance, flight times and favored nectar sources of Vermont's butterflies. The survey has allowed Vermonters to contribute to a greater understanding of the nature of their state, while providing essential data to landowners, land-use planners, municipalities, and other organizations making conservation and management decisions.

Multiscale Assessment of Biodiversity in New York State Parks

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We examined a collection of records on rare elements (rare species and significant ecological communities) found on NY State Park, gathered by NY State Natural Heritage Program. Over 1,000 rare element occurrences were reported for 135 parks, with the most records found for vascular plants (37%) and significant communities (31%). As predicted for general species richness, across NY State the mean number of rare elements was statistically correlated with park size, but with considerably scatter ($R^2 = .35$); the same held at a regional scale (Long Island parks). However, most rare species and significant communities were found in only 1–3 parks, indicating very little redundancy in the system. In addition, the number of public protected lands adjacent to state park lands was found to be a significant predictor of the status of rare vertebrates and unique animal assemblages, indicating a role for landscape connectivity in their preservation. The number of rare plants was a significant predictor of rare animals at statewide and regional scales, and the surrounding landscape. For regional analyses, rare invertebrates were correlated with landscape continuity variables, especially those associated with human land use. Two regional "hotspots" dominate the current dataset, Palisades and Long Island, whose coastal state parks contribute strongly to the dataset. Approximately half of all elements appear to be well protected, with high estimated viability and relatively large ranges of occurrence. However, many species and communities may require special focus in park management and statewide conservation efforts.

Monitoring Chemical, Physical and Biological Changes Associated with an Eurasian Watermilfoil Invasion

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The invasion of Eurasian watermilfoil into North American lakes has been rapid allowing little opportunity for detailed studies of the trophic changes associated with such invasions. For several years we have been studying the chemical, physical and biological changes within the littoral habitats of Lake George occurring with the introduction of milfoil. In 2003, four well-developed milfoil beds were identified for study: two small and secluded, and two larger and open. For each site submerged vegetation biomass, height, and density of the milfoil beds, transition zones and native communities were analyzed. Chemistry,

phytoplankton and epiphytes were sampled to evaluate the effect of canopy structure on primary producers. Phytoplankton biomass was greater inside the large beds compared to the natives, and greater outside in the smaller beds. When analyzing epiphytes, Chlorophyta dominated the larger beds and Chrysophyta dominated the smaller beds. Water nutrients has not shown a persistent trend, but a 24-hour sampling showed that the natives increase total filterable phosphorus, exceeding that of the milfoil, during the day, but drop below the milfoil levels during the evening hours. Anticipating significant differences in nutrient levels between natives and milfoil beds, sediment core analysis has been conducted for carbon, nitrogen, total phosphorus, bioavailable phosphorus, total organic content, and organic content by pore size. Data is presented to show the magnitude of impact of milfoil on the immediate surrounding waters and its subsequent influence on various components of the littoral food web.

Forgotten Floras: Developing Vouchered Collections from Underreported Counties of New York State

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According the newly released New York State Flora Atlas, the number of vascular plant species among the 62 counties varies from under 300 to over 1500. Admittedly many of the high counts are biased towards more populous counties and not necessarily those areas with greater inherent diversity. Documented voucher specimens are also poor for known invasive plants. For example, fewer than half of the counties indicate the presence of garlic mustard or Eurasian milfoil even though their physiographic distributions are generally known to extend statewide. A Species/Area curve analysis revealed no significant relationship of listed plant diversity with county land area, but our analysis was useful in identifying counties likely to be most underreported. Here we provide a protocol for updating herbarium collections in all New York counties, especially those that are likely to be underreported. We will use as an example the results of fieldwork in the summer of 2005 in Montgomery and Otsego counties where voucher specimens were recently collected as part of a Biodiversity Research Institute grant.

Benthic Invertebrates as Indicators of Water Quality in an Urban Stream

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The Bronx River, a highly urbanized system, has become a target of interest for restoration activities and clean-up. Beginning in 2002 and continuing through 2004 six sites, covering a four miles reach of the river and located completely within New York City's Bronx borough, were selected for study of its macro-invertebrate fauna to assess the water quality of this stretch of river. Invertebrate microorganisms have typically been used as indicators of water quality. Bodies of water that contain caddisfly larvae are considered to be of good quality, while those that contain a considerable amount of chironomides are considered to be of poor quality. In this study we followed the conventional assessment protocols as set by the NYSDEC. Each site was assessed in terms of species richness, EPT richness, and HBI values. In 2002 data indicated that all six stations, according to their respective HBI values, were classified as being fair or fairly poor. Chironomides dominated the samples with little to no caddisflies present. Over the following three year course of this study all six sites showed an improvement in status as indicated by HBI values. Five of the sites went from fair to good, thus demonstrating that clean-up and restoration efforts have had a positive impact on the system. One site did however show a change from fair to good from 2002 to 2003 but returned to fair in 2004. The presence of caddisfly larvae and other sensitive organisms showed an increase over the time period of this study.

Relative Trap Effectiveness and the Implications for Inventories of Small Mammals

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Inventorying at-risk small mammals is a difficult task, and multiple sampling techniques and protocols may be necessary for a comprehensive inventory. We used snap traps, live traps, and pitfall traps for a targeted inventory of small mammals along the Appalachian Trail from Pennsylvania through Connecticut. We recorded over 10,000 total trap nights and then evaluated the relative effectiveness of the different sampling techniques. Museum Special snap traps were significantly more effective than Sherman live traps for both our target species and also for small mammals in general ($p<0.01$). In addition, pitfall traps were much more effective than other trapping methods for sampling shrews in the genus *Sorex*. Park managers and conservation biologists require data on the distributions of at-risk species for their efforts to preserve small mammal populations. Our results suggest that strict reliance on live traps for these inventories may fail to identify many populations of at-risk small mammals.

Tree Removal Expands Habitat for Lupine and Frosted Elfin Butterfly

Williams, Ernest W. and William A. **Pfitsch** (Hamilton College, Clinton NY 13323)*

The decline of the NY threatened frosted elfin butterfly *Callophrys irus* (Godart) populations in the Rome Sand Plains (RSP) is directly related to loss of habitat of its host plant, wild blue lupine, as white pines invade the open sandy habitats where lupines grow. A frosted elfin population remains where lupines are the densest. We tested the hypotheses that tree canopy hinders lupine performance and restricts elfin behavior. Removal of central white pine trees in experimental plots resulted in dramatic increases in canopy openness. Lupine flowering stems and lupine cover significantly increased in the tree removal plots and remained constant or declined in the control plots. The total number of lupine stems has decreased in both control and cleared plots. Male frosted elfin butterflies establish mating territories in open sandy areas at the edges of lupine patches, particularly along tree-lined trails. New territories were established in several newly opened sandy patches where trees had been removed and have been maintained since the first year following tree removal. This rapid response by the butterflies reflects their behavioral choices for open areas and may match the flight paths of females moving among lupine patches. Selective tree removal at RSP benefits individual lupine plants and increases habitat for frosted elfin butterflies, but more extensive habitat manipulation may be necessary to increase lupine population numbers.

Clutch Size and Frequency in Italian Wall Lizards, *Podarcis sicula*, from New York

Wilson, Christopher J. (Department of Biology, Hofstra University, Hempstead, NY, 11548)*

Thirty seven female Italian wall lizards, *Podarcis sicula*, were collected from various sites on Long Island New York, and maintained in captivity from May through September of 2005. The lizards were housed and fed regularly and provided a place to lay their eggs. The lizards began laying eggs on May 31st and the last clutch was collected on June 30th. Clutch size was highly variable, ranging from 2 to 8 eggs per female. Clutch size was weakly correlated to body size (snout-vent length). Clutch frequency for these lizards was not found to be more than one per season. The eggs were incubated at a constant temperature of 28 degrees Celsius. With a hatch success rate of 43% This success rate is not high enough to rule out differential sex mortality of the young and can not therefore be used to make any conclusions regarding the method of sex determination in the Italian wall lizard.

Aerial-photographic Time Series of Rural and Suburban Sprawl in Albany County

Yantsides, Alexandra and Gary S. **Kleppel** (Department of Biological Sciences, University at Albany, SUNY, Albany, NY 12222)*

Among the impacts of suburban sprawl is the reduction of large agricultural fields and woodlands into smaller fragments, often bounded by managed landscapes and impervious surfaces, such as roads and parking lots. As a result, habitats are lost and, one would predict, biodiversity declines. We used a 31-year (1970–2001) timeseries of aerial photographs (orthophotoquads) obtained from the NY State GIS Clearinghouse to follow the fragmentation of a parcel of Albany Pine Bush habitat in Guilderland, New York. We then used a Species-Area Relationship (SAR) to predict the change in species richness in the parcel as a result of fragmentation. Between 1970 and 2001, the number of fragments doubled (from 16 to 33). Over the same time-period, mean fragment size declined by a factor of 3.0 (from 664 square m to 219 square m) and became more variable (coefficient of variation increased by 44 percent). The SAR was calibrated with data from the literature and predicted that among herbaceous plants, beta-diversity declined by 16% from 1970 to 2001. Field validation of the species richness estimated for 2005 with the SAR indicated an accuracy of 88.7 percent. Current studies of a rural community on the Helderberg escarpment suggest that rural development patterns may also cause significant fragmentation of large landscapes.

Role of Vision in Mating Behavior of Male *Nasonia vitripennis*

Yun, Jin J., Candace W. **Collmer**, A. Thomas **Vawter**, and Christina **Wahl** (Biological and Chemical Sciences, Wells College, Aurora, NY 13026)*

Like many insects, the parasitoid wasp *Nasonia vitripennis* displays stereotypic courtship behaviors characteristic of the species. These behaviors occur within minutes after the first exposure of males to females. The latent period before the male mounts the female and begins head nods that lead to female receptivity can be particularly important for male *N. vitripennis* because they are brachypterous and cannot follow a female that flies away. Courtship begins when a male pursues the female for a short distance and then mounts the female's head. This is followed by cyclical repetitions of characteristic combinations of head nods, mouthpart extrusions and antennal sweeps that usually elicit female receptivity, followed by copulation. My

research explores the effect of vision on courtship behavior in male *N. vitripennis*. My hypothesis was that *N. vitripennis* males lacking vision would be handicapped in beginning courtship. Males were visually impaired by placing a small drop of diluted acrylic paint over their eyes. My results indicate that the time elapsed for visually-impaired males to begin courtship (N=39, mean=3.80 minutes) was significantly longer than that for control males with paint on their heads (N=30, mean=2.60 minutes). This suggests that vision contributes to eliciting male courtship in this species.

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Addendum to Abstract Volume (Late Additions)

Abstracts for Oral Presentations

Timber Rattlesnake Population Structure in Habitats Fragmented by Roads

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Timber rattlesnakes are a state-listed species in New York that has become increasingly threatened by anthropogenic development. Despite growing concern for their status, we know little about basic aspects of their population ecology. In order to examine fine-scale population structure of this species, we've genotyped approximately 400 snakes at 9 polymorphic microsatellite loci; these snakes come from 16 dens in 3 different regions of the state. Major roads cut between some of these dens, whereas other dens have no obvious dispersal barriers between them. A preliminary analysis of population genetic data reveals that gene flow between dens is primarily maintained by males mating with females from adjacent dens. Major roads have a strong impact on gene flow, increasing genetic differentiation between populations and decreasing genetic diversity within populations. Any developments that would increase road traffic in areas where timber rattlesnakes occur are likely to have a highly detrimental effect on the long-term survival of the impacted populations.

Assessing the Conservation Status of Odonates in New Hampshire

***Hunt**[*], Pamela D. (New Hampshire Audubon, Concord, NH 03301)*

The rapid rise in interest in odonates among naturalists has led to significant contributions to our knowledge base in much of New England, and New Hampshire is no exception. In the last decade, extensive observation and collecting have added 15 species to the state list, and greatly refined our knowledge of statewide distributions for many other species. As a result, New Hampshire is in a position to use these new data to assess the conservation status of its odonate fauna, including the potential to list species as threatened or endangered, or prioritize habitats in which sensitive species occur. In this paper I will present an overview of the process being used for this assessment and some of the preliminary results. This will include a summary of the New Hampshire distributions of odonata of conservation concern in other New England states.

The Otisville Mastodon's Last Meal?

***Robinson**[*], Guy. S., David A. **Burney**, and Lida **Pigott Burney** (Department of Biological Sciences, Fordham University, Bronx, NY 10458)*

Bones of an American mastodon (*Mammut americanum)* were discovered in 1872 by a peat digger on the Mitchell farm near Otisville, NY. Othniel Charles Marsh purchased the skeleton in 1875 by for the Peabody Museum in New Haven, Connecticut, where it remains on display. Recently, a vertebral fragment not included in the mounting and showing no evidence of chemical treatment has yielded an AMS bone collagen date of 10,978± 40 ^{14}C yr BP. Other materials acquired with the skeleton, include what appears to be a dung bolus, composed of masticated plant material from deciduous tree and monocot leaves. A newspaper account from 19 March 1872 refers to "a quantity of undigested matter" found in the paunch area of the animal, further describing it as composed of "fresh-looking and very large leaves of odd form, and blades of strange grass of unusual length …. looking as though they were freshly cropped from the earth, …" A sample of the suspected dung bolus has been analyzed for pollen and microfossils to compare with a recently completed pollen stratigraphy of the Otisville site. The pollen spectrum of the bolus is dominated by spruce and diploxylon pine, along with oak, birch and fir. This is a close match with the late glacial Younger Dryas zone of the Otisville bog stratigraphy, and therefore is in chronological agreement with the AMS bone collagen date for the mastodon.

Corrections to Printed Abstract Volume

"USDA Forest Service" was missing from the organization affiliations of Gary Wade and Marla Emory in Luis Malaret's abstract. The corrected author line for this abstract is as follows:

Impact of Silvicultural Practices on Leaf Litter Amphibians in the Adirondacks

Malaret[*,1]*, Luis, Gary* ***Wade***[2]*, Monika* ***Szymurska***[3]*, Rachel* ***Regeczi***[3]*, Dianne* ***Rocheleau***[4]***,*** *and Marla* ***Emery***[2] *([1]Biology Department, CCRI, Lincoln, RI 02865; [2]Northeastern Research Station, USDA Forest Service, Burlington, VT 05402; [3]Clark University, Worcester, MA 01610; [4]Graduate School of Geography, Clark University, Worcester, MA 01610)*

The department for Erik Lema was incorrectly identified in the abstract volume. The corrected author line for this abstract is as follows:

Japanese Knotweed Control along Road Corridors in Blue Mountain Lake, New York

Nowak[1]*, Christopher A., and E.* ***Lema***[*,2] *([1]Faculty of Forest and Natural Resources Management, SUNY College of Environmental Science and Forestry, Syracuse, NY 13210; [2]MS Candidate of Forest and Natural Resources Management, SUNY College of Environmental Science and Forestry, Syracuse, NY 13210)*